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Long term micrometeorological and energy budget measurements in Agrometeorological Observatory in Debrecen

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Following a short review of the history of the micrometeorological measurements in Hungary, the history of the agrometeorological observatory in Debrecen will be described. The measurement program of the observatory, its instrumentation and the structure of the available database will be introduced. The analysis of the radiation budget components above plant canopy, the heat and water demand of crops, the study of different components of the vegetation climate – such as micro-advection or edge-effect – and the measurement of carbon-dioxide concentration are among the still most significant research topics.

The observatory renewed in 2008. It is a member of the Hungarian background climate monitoring network. Its basic role is the more precise identification of future changes in the climate conditions. More profound emphasis is taken on the assessment of surface energy budget components. Besides traditional climate and agrometeorological measurements, radiation budget components are measured using high precision instruments that are fitting the WMO standards. The profiles of soil temperature and moisture and the energy balance of the upper soil layers are also investigated. Turbulent fluxes (momentum, sensible and latent heat, carbon-dioxide flux) are measured using the eddy-covariance technique. High precision wind, temperature and humidity profiles are measured in the 10 m layer above ground surface, making available the application of Bowen-ration, modified Bowen ratio, gradient and profile methods for the calculation of turbulent fluxes.

Further goals of the developments are i) the comparison of different flux calculation methods, ii) the optimization of energy budget component estimation, iii) the extension of the measurement program, the more detailed investigation of the basic physical parameters describing the deeper soil layers (soil moisture, soil temperature, soil heat flux) and the installation of mobile measurement units in the surrounding experimental parcels.

The data assessment process will be introduced, daily and seasonal variation of different profile measurements, surface radiation and energy budget components will be demonstrated. The uncertainty in the energy budget components from measurement and calculation will also be discussed.