



Application of detailed temperature profile measurements for improving data quality check by Bowen Ratio/Energy Balance method

Gabriela Pozníková (1,2), Milan Fischer (1,3), Matěj Orság (1,2), Miroslav Trnka (1,2), Zdeněk Žalud (1,2)

(1) Global Change Research Centre, AS CR, v.v.i., Czech Republic, Brno, Czech Republic (g.poznikova@gmail.com), (2) Mendel University in Brno, Department of Agrosystems and Bioclimatology, Czech Republic, (3) North Carolina State University, Department of Forestry and Environmental Resources, Raleigh, NC, United States

Water plays a key role in the functionality and sustainability of the ecosystems. In the light of the predicted climate change research should be focused on the water cycle and its individual components. Apart from the runoff, the major component of the water balance which drives the water from the ecosystems is represented by the evapotranspiration (ET). One of the standard methods for measuring ET is Bowen Ratio/Energy Balance method (BREB). It is based on the assumption that the water vapour and heat are transported by identical eddies with equal efficiency. In fact, this basic premise is based on a more complicated Monin-Obukhov similarity theory that explains the relationship between the profiles of wind, temperature and water vapour in the surface layer of the atmosphere. When BREB method is used we assume that the profiles of temperature and air humidity are ideally logarithmic or at least consistent. However, as this method is usually based on the measurements of temperature and humidity in only two heights, it is difficult to verify this assumption.

We therefore conducted a field experiment using 4m high measurement-mast with 20 thermocouples connected to data-logger for detailed measurement of air temperature profile above different covers, e.g. grassland, spring barley, poplar plantation. The main goal of our effort was to capture so called “kink” in the profile of the temperature and verify if the assumptions made by BREB hold under various weather conditions and over different canopies testing the basic requirements of the BREB method use. Finally we devised a technique improving data selection for subsequent ET calculation. This study was funded by project "Building up a multidisciplinary scientific team focused on drought" No. CZ.1.07/2.3.00/20.0248,PASED - project supported by Czech program KONTAKT II No. LH12037 “Development of models for assessment of abiotic stresses in selected bioenergy plants” and LD130030 project supporting COST action ES1106.