EMS Annual Meeting Abstracts
Vol. 11, EMS2014-553, 2014
14th EMS / 10th ECAC

Multi-season variability of evapotranspiration on urban and rural areas in Central Poland – selected results of direct measurements and numerical estimations.

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Assessment of evapotranspiration (ET) rates in urban and rural environments is very important for understanding and modeling many processes like water balance, plants cultivation, urban development or climate change. Evapotranspiration from urban areas is assumed to be less than from neighbor rural areas due to contrast of hydrologic processes on built-up areas and vegetation covered soils. The most direct way to measure evapotranspiration at urban area involves the eddy correlation approach. This method requires special sensor which measure rapid fluctuations (10 Hz) in the vertical velocity and water content of the air.
This study presents the comparison of urban and rural evapotranspiration assessed on the base of direct eddy covariance measurements and a few indirect techniques: Penman-Monteith method, Priestley-Taylor algorithm and Turc approach. The urban evapotranspiration is measured at two sites located in the core of old center city of Łódź (Central Poland). The rural measurement site is located near the small village Annosław, 60 km to the east from Łódź.
The analysis shows that the evapotranspiration in urban and rural area is characterized by clear diurnal course with maximum at noon (summer season). The comparison of the result confirms lower evapotranspiration from city surface. Application of Penamn-Monteith method for potential evapotranspiration estimation presents similar results to those obtained from eddy covariance measurement (correlation coefficients during the summer months from 0.77 to 0.9). Some discrepancies are noticed during the night hours.

Key words: evaporation, eddy covariance method, urban climate