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Nocturnal cooling and intensity of atmospheric Urban Heat Island in Brno (Czech Republic)

L. Řezníčková, L. Krahula, and P. Dobrovolný
Masaryk University, Department of Geography, Brno, Czech Republic (ladkar@sci.muni.cz)

Mobile air temperature measurements and measurements made in a network of stations distributed in urbanized area of Brno, Czech Republic (380 ths. inhabitants, complex topography) are used to characterize nocturnal cooling, intensity and spatial variability of atmospheric Urban Heat Island (UHI). Measurements from a set of days with clear sky and no advection are analyzed for individual seasons. Study region was described with a set of environmental and surface parameters such as altitude, land use category, Sky View Factor (SVF), amount of vegetation (NDVI) and density of buildings (DENS). Overall intensity of atmospheric UHI is defined as a difference between mean measurement in urban and rural environment. Due to a complex environment also intra-urban differences are described. Based on station measurements we found that in all seasons UHI clearly develops during night hours and overall average UHI intensity reach 1.0 – 1.5°C. However, mobile measurements proved that in certain parts of the city significantly warmer and cooler regions are formed. These "hot" and "cold" spots are typical with characteristic values of environmental variables. Finally we quantify to what extent individual variables contribute to UHI intensity in the study area.