



Spatial and temporal variability of urban heat island intensity in Brno (Czech Republic)

P. Dobrovolný, L. Řezníčková, and L. Krahula

Masaryk University, Department of Geography, Brno, Czech Republic (dobro@sci.muni.cz)

Detailed air temperature measurements from a network of 14 stations distributed in urbanized area of Brno, Czech Republic (380 ths. inhabitants, complex terrain) are analyzed with the aim to describe spatial and temporal variability in atmospheric Urban Heat Island (UHI). Each station environment was characterized with a set of parameters such as altitude, Sky View Factor (SVF), amount of vegetation (NDVI) and density of buildings (DENS) in station's neighborhood. Temperature measurements made in 10 min. intervals from a set of 64 calm and sunny days (DJF-6, MAM-26, JJA-21, SON-11) made between March 2010–May 2011 were used to characterize each station with several air temperature characteristics. Difference between temperature measurement at individual station and average temperature measurements of rural stations was used as a simple measure of UHI intensity. We found that in all seasons UHI clearly develops during night hours and also around noon while in morning and evening hours the temperature differences between urban and rural stations are close to zero. Maximum UHI intensity (about 2.5°C) appears in summer midday, typical UHI intensities in night hours reach 1.0–1.5°C in all seasons. From correlation analysis it follows that independent variables (SVF, NDVI, DENS) significantly correlate with minimum temperature (T_{min}) and UHI intensity (ΔT) and altogether they explain about 60% of ΔT . Spatial variability of UHI intensity is compared with Land Surface Temperature fields derived for Brno region from thermal satellite imagery. We demonstrate that the highest LST values typically occur in industrial and commercial areas, which contribute significantly to UHI intensity.