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UHI spatial structure in Brno (Czech Republic) derived from mobile measurements

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Spatial air temperature distribution and the intensity of UHI in the early night hours were analyzed in urbanized area of Brno, Czech Republic (380 ths. inhabitants, complex terrain) from data gathered from mobile measurements. Air temperature was measured along several profiles that ran though the city centre and also in various suburban environments. Altogether, nine sets of measurements were taken (each around 90 km in length), covering the seasons. Air temperatures were measured at a frequency of 5 sec, which approximates to 50 metres apart. All the temperature profiles exhibited a typical UHI structure, with the highest temperatures in the city centre and cooler areas further from heavily built-up areas. The air temperature range was 8–10°C in spring and summer and 5–6°C in autumn and winter. The mobile temperature measurements correlated significantly with NDVI values but also with density of buildings, although they disclosed no significant relation to altitude. Air temperatures interpolated from mobile measurements and NDVI values indicate that the early-night mean UHI intensity is highest (approx. 5°C in summer) in the city centre and decreases radially towards suburban areas with lower percentages of buildings and higher vegetation cover. This temperature drop is less marked as one moves east from the middle of the city because industrial areas and transport facilities tend to concentrate in this area and they contribute more significantly to higher temperatures than residential areas.