

Rapid fluctuations of the air and surface temperature in the city of Bucharest (Romania)

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Urban areas derive significant changes of the ambient temperature generating specific challenges for society and infrastructure. Extreme temperature events, heat and cold waves affect the human comfort, increase the health risk, and require specific building regulations and emergency preparedness, strongly related to the magnitude and frequency of the thermal hazards.

Rapid changes of the temperature put a particular stress for the urban settlements, and the topic has been approached constantly in the scientific literature. Due to its geographical position in a plain area with a temperate climate and noticeable continental influence, the city of Bucharest (Romania) deals with high seasonal and daily temperature variations. However, rapid fluctuations also occur at sub-daily scale caused by cold or warm air advections or by very local effects (e.g. radiative heat exchange, local precipitation). For example, in the area of Bucharest, the cold fronts of the warm season may trigger temperature decreasing up to 10-15 centigrades / hour, while warm advections lead to increasing of 1-2 centigrades / hour.

This study focuses on the hourly and sub-hourly temperature variations over the period November 2014 – February 2016, using air temperature data collected from urban sensors and meteorological stations of the national network, and land surface temperature data obtained from satellite remote sensing. The analysis returns different statistics, such as magnitude, intensity, frequency, simultaneous occurrence and areal coverage of the rapid temperature fluctuations. Furthermore, the generating factors for each case study are assessed, and the results are used to define some preliminary patterns and enhance the urban temperature forecast at fine scale.

The study was funded by the Romanian Programme Partnership in Priority Domains, PN – II – PCCA – 2013 – 4 – 0509 - Reducing UHI effects to improve urban comfort and balance energy consumption in Bucharest (REDBHI).