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Spatial extend and magnitude of urban heat island phenomena in selected cities in Central Europe – assessment based on land surface temperature from satellite observations and modelling results

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The phenomenon of urbanization is an important environmental and social issue the modern society has to face. According to current estimates half of world's population lives in urban areas. It is expected that urban population will grow in the future. Consequently, there is a pressing need for multidisciplinary studies of all aspects of the urban environment. Urbanization and subsequent release of anthropogenic heat pollution leads to a formation of an urban heat island (UHI). Development of UHI is a highly non-linear process (Kato et al., 2007) that depends on a number of factors such as magnitude of the anthropogenic heat flux, texture of a city, local geophysical conditions and mesoscale meteorology (Sailor and Lu, 2004 after Narumi et al., 2003).

We will present analyses of the magnitude and spatial extend of UHI over major cities in Central Europe. We will use satellite observations and modeling results in our analysis. UHI characteristics will be identified based on the Land Surface Temperature (LST) product derived for MODIS observations for selected clear-sky periods in 2012. The Global Environmental Multiscale (GEM) model (Cote et al., 1998) with the Town Energy Balance parameterization module (Masson, 2000) will be used to simulate the development of UHI. The GEM model will be run in a self-nesting configuration over Central Europe. Resolution of modelling domains will be set at 10km for the global variable grid and cascaded down to 1 km over selected cities. At a given resolution the representation of urban areas will be defined by a simple urban cover description (Struzewska and Kaminski, 2012). A comprehensive representation of urban cover will be applied at the final resolution. Surface temperature from the model will be evaluated against the LST data.