Geophysical Research Abstracts
Vol. 17, EGU2015-1594, 2015
EGU General Assembly 2015

Modelling urban climate under global climate change in Central European cities

Maja Zuvela-Aloise (1), Anita Bokwa (2), Petr Dobrovolny (3), Tamas Gal (4), Jan Geletic (3), Agnes Gulyas (4), Monika Hajto (5), Brigitta Hollosi (1), Rafal Kielar (5), Michal Lehnert (6), Nora Skarbit (4), Pavel Stastny (7), Marek Svec (7), Janos Unger (4), Miroslav Vysoudil (6), and Jakub P. Walawender (5)

(1) ZAMG, Vienna, Austria (maja.zuvela-aloise@zamg.ac.at), (2) Jagiellonian University, Krakow, Poland, (3) Global Change Research Centre AS CR, Brno, Czech Republic, (4) University of Szeged, Szeged, Hungary, (5) Institute of Meteorology and Water Management - National Research Institute, Krakow, Poland, (6) Palacky University Olomouc, Olomouc, Czech Republic, (7) Slovak Hydrometeorological Institute, Bratislava, Slovakia

The global and regional climate warming is expected to increase the heat load in urban areas. In order to develop adaptation and mitigation strategies in particular cities, it is necessary to evaluate possible range of heat load increase, in terms of both its magnitude and spatial extent. The present study shows preliminary results of an international project aimed to evaluate the expected heat load increase in four Central European cities (Krakow, Poland; Bratislava, Slovakia; Brno, Czech Republic and Szeged, Hungary) using the non-hydrostatic MUKLIMO 3 model developed by DWD (Deutscher Wetterdienst) for micro-scale urban climate and planning applications. The investigation is focused on the spatial gradients of temperature during potential summer day conditions and possible change in heat load signal under future climate conditions. In order to identify thermally sensitive areas within the city, idealized simulations of temperature, wind and relative humidity in the urban area are performed based on the orography and land use data with 100 m resolution. The model setup uses standardize classification of land use properties based on local climate zones (LCZ) classification system (Stewart and Oke, 2012) which allows inter-comparison of the modelling results. The Landsat satellite images are used to identify typical land use classes in all the cities. The climatological changes in urban heat load are evaluated in terms of expected increase in the mean annual number of summer days (Tmax $\geq$ 25°C). The 30-year climatological indices are calculated based on the cuboid method. Timeseries of mean daily temperature, wind and relative humidity from a local meteorological station are used to evaluate the climatic indices for the recent climatic period, while the future climate signal is based on the data from regional climate projections of the EURO-CORDEX project.
The project “Urban climate in Central European cities and global climate change” is funded within the framework of the International Visegrad Fund’s Standard Grant No. 21410222 in the period 2014-2015.