MAPPING THE LOCAL CLIMATE ZONES AND APPLICATION IT AS A LAND USE INFORMATION FOR MUKLIMO URBAN CLIMATE MODEL

Authors: *Tamás Gál**, Dep. of Climatology and Landscape Ecology, University of Szeged, Hungary; *Anita Bokwa*; *Petr Dobrovolny*; *Jan Geletic*, Masaryk University Brno, Czech Republic; *Ágnes Gulyás*; *Monika Hajto*; *Brigitte Hollosi*; *Rafal Kielar*; *Michal Lehnert*, Department of Geography at the Faculty of Science, Palacký University in Olomouc, Czech Republic; *Nóra Skarbit*, University of Szeged, Magyarország; *Pavel Stastny*; *Marek Svec*; *János Unger*, Dep. Climatology and Landscape Ecology, University of Szeged, Hungary; *Miroslav Vysoudil*; *Jakub Walawender*; *Maja Zuvela-Aloise*

Keywords: climate change, local climate zones, urban climate model

Abstract: Urban climate modelling is essential to reveal the trend of the urban heat load caused by the climate change. Within the project "Urban climate in Central European cities and global climate change" (IVF-21410222) we examine the impact of global warming on Central European cities. Therefore we perform modelling analyses of possible future changes of urban climate in four cities in Hungary, the Czech Republic, Slovakia and Poland. For this analysis we use the urban climate model MUKLIMO_3. Different input datasets are necessary to describe the model domain. The so-called Land Use Table determines the land use characteristics of the study area. This table includes land use classes, and for each class there are 26 physical parameters (building fraction, wall area index etc.). Another input data is the Land Use File, which contains the identification value of the land use class for every grid cell of the model domain. The advantage of this model is the possibility to use arbitrary land use classification system. The recently developed Local Climate Zones (LCZ) classification system can be a good choice for the land use information, because it is a climate-based land use classification system and it describes the physical conditions of the local-scale environment. It is not site specific, and the different classes represent different thermal reactions. We applied Bechtel's method for mapping of the LCZ classes, using satellite data (Landsat 7, 8). In this paper we present this land use mapping process in the example of Szeged, Hungary and the preliminary results of the model.

DELIMITATION OF LOCAL CLIMATE ZONES BASED ON ZABAGED DATABASE IN THE CZECH REPUBLIC

Authors: *Jan Geletic**, Masaryk University Brno, Czech Republic; *Michal Lehnert*, Department of Geography at the Faculty of Science, Palacký University in Olomouc, Czech Republic

Keywords: GIS mapping, local climate zones, ZABAGED

Abstract: In recent years the concept of Local climate zones (LCZ) has become the standard in study of urban climate. There are therefore efforts to use this classification as a mapping method. With a radical shift in the concept of LCZ have emerged new methodological problems (e.g. spatial resolution/pixel size, the degree of generalization, the method of calculating the physical a geometric parameters, validation and standardization of classification procedures etc.). Developing universal LCZ mapping method for the Czech Republic we are trying to address all of these problems. The first prototypes of classification based on decision rules established on the training areas were completed for Brno and Olomouc and their surroundings. Preliminary research has shown that the most suitable input data for classification provides vector database ZABAGED® covering the entire area of the Czech Republic. Validation through comparison of classification results based on data from ZABAGED® and classification result based on our own precise ad hoc data show a very good results for testing areas. Manual correction of input attributes is in some cases still unavoidable. However data preparation procedure is already reasonably time consuming. It turns out that LCZ classification made on the basis of the real physical properties of the environment is more accurate than classification based on remote sensing data based characteristic and therefore deserves further research.

ATMOSPHERIC URBAN HEAT ISLAND DETECTION BY DIRECT MEASUREMENTS IN CLUJ-NAPOCA CITY, ROMANIA

Authors: *Ioana Herbel**, Romania; *Antonio Flavius Ciupertea*, Babes-Bolyai University, Romania; *Adina-Eliza C Croitoru**, Babes-Bolyai University, Romania; *Gabriela Victoria Harpa*, Babes-Bolyai University, Romania; *Ionuț Rus*, Babes-Bolyai University, Romania

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Abstract: The intensification of the urbanization process in the last decades affects not only the quality of the environment but also the quality of life in large cities worldwide. In Romania, as a former communist country, another important process that has a major influence for the urban climate is the forced industrialization from the communist era. One of the most important consequences of the above mentioned processes is the urban heat island (UHI), a climatic phenomenon that involves increased air and surface temperature values in the city when compared to the nearby rural areas.

The purpose of this study is to identify these temperature differences and to obtain the first overview of the atmospheric urban heat island (AUHI) in Cluj-Napoca city, Romania. In order to highlight the intensity of this phenomenon in the study area, a mixed method has been used that combines a mobile transverse study on three different routes along the city street network, performed by car, with observations in fixed, representative points from the city. All the observations have been performed at 1.5 m above the ground level, during the night, in different seasons and weather conditions. The data that resulted from the mobile transverse method have been subjected to time and altitude corrections, based on the fixed points measurements. The deviation of all the points compared to the center of the city has been computed. The hot spots of the cities have been identified in central area and in concrete block of flats neighborhood. The results of the research are detailed in the content of the paper.