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Analysing the daily cycles of temperature and humidity differences between downtown and suburban environment in Budapest

Rita Pongracz, Judit Bartholy, Zsuzsanna Dezso, Csenge Dian, Dora Incze, and Mate Kurcsics
Eotvos Lorand University, Budapest, Hungary (prita@nimbus.elte.hu)

Urban areas evidently results in a substantial modification of natural environment including the local climatic conditions, which fundamentally influence everyday life. That is why it is important to address urban climatic issues, e.g. the urban heat island effect and its consequences. Due to the strong centralised structure of Hungary the most affected region in Hungary is the capital (Budapest) and its agglomeration area. In this research we aim to analyze the urban climatic effects in a downtown district of Budapest relative to the southeastern suburb district of the city where the synoptic station of Budapest is located.
For this purpose, we started a measuring program of in-situ measurements in the spring of 2015 in the southern central located district (district IX), which can be found near the river Danube, and mainly consists of 3- and 4-storey older and newly built buildings. The newly built buildings are mainly the results of the local government's efforts to improve the environment for the citizens. Within the framework of the block rehabilitation program, inner parts of the old house blocks were demolished, and inside the blocks common green areas have been created. In our urban climate measurement program the resulting climatic conditions are evaluated with air temperature and relative humidity data recorded along a pre-defined path, which consists of 24 measuring points within the studied area. The measuring sites are located in different characteristical points of the district, such as green parks, narrow streets, paved squares and roads. In order to calculate the urban heat island intensity, temperature measurements are compared to the hourly recorded data of the synoptic station (ID number: 12843). Our relative humidity measurements are also compared to the humidity in the suburbs.
Prior to the summer measuring campaign in 2016, measurements were recorded only in the daytime periods. The measuring period has been extended for 24 hours, thus, continuous 3-day-long temperature and humidity measurements were recorded during 4-6 July 2016. Moreover, new measuring instruments were used during this summer measurements with more accurate sensors and data loggers. After the summer measuring campaign the whole measurement program continued in autumn (6 days starting at 14 pm Thursdays and lasting 24 hours). Thus, summer and autumn daily cycles can be compared in the different types of the urban environment.