EMS Annual Meeting Abstracts
Vol. 14, EMS2017-195, 2017

Modelling urban heat load mitigation strategies on an example of the city of Graz

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The climate change projections for the Austrian cities indicate that the observed warming trend is expected to continue in the coming decades. Excess in heat load in urban areas due to the Urban Heat Island (UHI) effect increases health risks for the urban population. Number of counteracting measures for reduction of the UHI effect, such as increase in vegetation, green open spaces, green roofs, unsealing of paved surfaces, decreasing absorption of solar radiation by increasing the reflectiveness of buildings and paved surfaces are considered in the scope of sustainable urban development and climate sensitive urban planning. In order to develop effective climate adaptation strategies for application in the existing urban structure, the expected cooling effects need to be quantified. This study investigates the effectivness of different climate adaptation measures to reduce the UHI effect in a densely built-up environment on an example of the residential and business district of Jakomini in the city of Graz/Styria. The current local climate conditions are simulated with the urban climate model MUKLIMO_3 of the German Weather Service (DWD) using existing and altered land use characteristics corresponding to application of different UHI counteracting measures. The gradual increase in green areas, existing potential for green roofs implementation, modification in reflectivity of roofs and façades as well as unsealing of paved surfaces is considered. The resulting difference in heat load is evaluated as the potential cooling effect for the area of the Jakomini district and its surroundings. Based on the model results, a set of measures with optimal climatic impact is identified and further implementation strategies are developed in close cooperation with the city's planning department. The study is supported within the Austrian FFG and KLIEN Smart Cities project JACKY COOL CHECK (Project Nr. 855554).