



Numerical simulations of urban heat island mitigation strategies in Vienna

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Effects of change in land use on daytime urban heat island (UHI) of Vienna is investigated using the local-scale atmospheric model MUKLIMO_3 developed at the German Weather Service (DWD). Assuming that the observed trend towards urbanization negatively impacts the heat stress of urban areas, it becomes increasingly important to develop UHI mitigation strategies that aims to reduce the urban heat stress. The purpose of this study is to gain a further understanding of the structure of the daytime UHI in Vienna and to investigate the question to what degree changes in the urban land use affect the near-surface climate and heat stress in the city. The qualitative and quantitative characterization of the UHI is obtained by the computation of the mean annual number of summer days ($T_{\max} \geq 25^{\circ}\text{C}$) of the 1981–2010 period using the so-called cuboid method (DWD). A set of mitigation strategies is developed and applied to MUKLIMO_3 simulation experiments. The strategies take into account the change in urban land use as well as the modification of land use features. Results confirm the importance of green areas, water ways and pervious surfaces in the city. In addition, the size, location and distribution of new vegetated areas, i.e. parks, can crucially alter the urban heat stress. In view of the unique character of the city, the realization of adequate mitigation strategies is mainly limited to the existing urban land use. The obtained model results are intended to provide additional information for the city planners.