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Urban climate of Vienna - modelling study of urban heat stress under climate change conditions

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The urban heat excess in the city of Vienna shows significant positive trends in the past decades due to the changes in urban morphology and energy consumption. This study is intended to evaluate the impact of the climate change on the urban heat stress and the efficiency of adaptation strategies in city planning of Vienna. In cooperation with the German Meteorological Service (DWD) we applied a dynamical urban climate model MUKLIMO_3 to simulate the local scale circulation based on the high resolution topography and land use data provided by the Vienna city administration. The computational domains cover broad Vienna metropolitan area (66000x56000 m2) with a resolution of 200 m and Vienna City (31000x24000 m2) with a resolution of 100 m. The cuboid method is used to perform climatological analysis based on observational timeseries and to derive climate indices for the periods 1961-1990, 1971-2000 and 1981-2010. Climatological data from approximately 15 local monitoring stations are used to validate the modelling results and to identify thermally sensitive areas within the city. In order to estimate future climate signal in the urban area, we used different regional model projections to provide background climate conditions and compared the output with the reference simulation. The urban model results should help to develop urban planning strategies to mitigate the impact of heat stress on the population and can be expected to provide guidelines for the policy making in city management.