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A projection of the rural and urban human thermal comfort in the Netherlands

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Compared to rural areas, urban temperatures are often higher (urban heat island effect). This can cause relatively high heat stress in summer, which leads to thermal discomfort or even a higher mortality for vulnerable groups (children, elderly etc.). To propose adequate measures to prevent adverse health conditions the future thermal comfort needs to be estimated. This study analyses the future thermal comfort for the Dutch cities and rural neighbourhoods on a local scale. Observed weather data from the episode 1976-2005 are transformed to future weather design data representing 2050, based on the KNMI'06 climate scenarios. The RayMan model is used to estimate the thermal comfort (Physiological Equivalent Temperature, PET) for these future scenarios. Herein, urban wind reduction, sky view factor and sun path are import factors in assessing thermal comfort. Results reveal that all four KNMI'06 scenarios project a substantial increase of the number heat stress hours. Future climate projections show a significant amount of heat stress can occur especially in urban areas, particularly for the warmest scenarios (G+ and W+). In these scenarios, the frequency of hours with heat stress more than double, and the increase will develop faster in an urban canyon than in rural areas. However during extreme heat stress urban canyons can also provide more shading, which leads to lower PET values