Impact of climate change on the heat load in Frankfurt metropolitan region
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Abstract

Most global circulation models simulate a future rise of air temperature. As one consequence of this warming the urban heat island (UHI) is intensified. Since already more than half of the world's population live in cities and urbanization proceeds rapidly UHI will become even more important in future. To enable urban planners to come to reasonable decisions regarding the future living standard a detailed climatology on the residential scale is required. To estimate the impact of climate change on UHI we drive the urban scale climate model MUKLiMO_3 with climate projections of different regional climate models for the Frankfurt metropolitan region. For an effective use of computing time the cuboids' method is developed which deduces the meteorological conditions of a climatological time series from eight MUKLiMO_3 simulations only. The initial conditions of these simulations were chosen to cover the range of heat load conditions. To realistically represent the variability of residential areas ten different building structures were considered in the simulations. The results for the time series are then used to calculate several temperature indices and their change in time compared to their present day values. Furthermore, an evaluation of both the cuboids’ method and the temperature indices is presented.