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Developing an urban climate and air quality tool for urban planning purposes

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Due to the nature of the urban street configuration, local land use, and anthropogenic heat production, the urban climate differs from its rural counterparts. Particularly during calm and warm summer days, so called urban canyon layer heat island effect may develop a temperature difference between the urban and rural areas up to several degrees. This may negatively affect the human thermal comfort, health, and labour productivity. At the same time warm, calm and clear sky weather supports the urban chemistry towards undesirable urban air quality, which limits the health of urban dwellers as well. In order to optimize the human thermal comfort and health, policy makers and urban planners need assessment tools to evaluate the state of the urban climate.
In this study we develop an urban climate and air quality tool which facilitates policy makers and urban planners to evaluate thermal comfort and air quality at the neighbourhood scale. First, the scheme innovatively develops a combined index for the urban thermal comfort and air quality. Then WRF mesoscale model results are performed to develop a scaling of the urban heat island effect for a range of urban morphological parameters. Finally these are presented in a quick scan and a more elaborated assessment tool for the diurnal cycle in the urban environment.