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Summer in the city - High Resolution Modelling and Validation of Urban Weather and Human Thermal Comfort

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Urbanization affects human thermal comfort and health, especially for vulnerable groups such as the elderly and people with established health issues. Physical properties of the urban material are often such that thermal human comfort, work productivity and public health are worse than on the surrounding countryside, particularly on hot summer days. The goal of the current work is to develop and validate a prototype high-resolution modelling system for human thermal comfort in urban areas, which can be exploited by weather and health agencies for urban weather forecasting and heat wave warnings. We explore the WRF model system with a 100 meter grid resolution for both land use and the characteristics of the built environment. For the validation of the WRF model novel observations are used from fixed meteorological stations in urban areas, bike traverses by mobile platforms (cargo bikes) equipped with state-of-the-art meteorological measurement devices (Heusinkveld et al., 2014) and stations operated by hobby meteorologists (Steeneveld et al., 2011). Within the framework of this work, the system will be validated for a number of warm weather conditions episodes in Dutch cities that differ with respect to their morphological characteristics, topography and land use in the surrounding rural areas.