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Specification of urban canopy parameters for better understanding the thermal structure in case of Szeged, Hungary

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The features of urban surfaces are incorporated in mesoscale numerical models by employing single and multi-layer canopy parameterization. In these models, the applied urban land use information is crucial. It is essential to improve the details of canopy parameterization if the land use information does not represent precisely the urban forms in a specific area. In this study, the default parameters of Urban Canopy Model in Weather Research and Forecasting (WRF) model were specified in order to take the local circumstances into account and analyse whether the refined parameters are able to improve our simulations. High-resolution remote sensing products of Landsat 8 OLI/TIRS satellite and multiple GIS techniques were applied to determine the sufficient canopy values (e.g. urban and vegetation fraction, building height). To analyse the impact of the urban canopy parameters on simulations, a short (anticyclonic) period was chosen from the summer of 2015. Then we evaluated the model performance against the data of the field observation network in Szeged. The results suggest that WRF with improved urban canopy parameters is able to capture the urban heat island and thermal patterns (i.e. cold and hot spots) are better represented in contrast with the default case. It also must be pointed out that the simulated 2-m temperatures are much closer to the observations during both daytime and nighttime by replacing the default canopy values. Consequently, it is concluded that the introduction of new parameters decreases the model uncertainties and represents more accurately the urban canopy in Szeged.