

EGU24-3735, updated on 08 Feb 2025

<https://doi.org/10.5194/egusphere-egu24-3735>

EGU General Assembly 2024

© Author(s) 2025. This work is distributed under the Creative Commons Attribution 4.0 License.



Impacts of Urbanization and Its Parameters on Thermal and Dynamic Fields in Hangzhou: A Sensitivity Study Using the Weather Research and Forecasting Urban Model

Mengwen Wu¹, Meiyong Dong¹, Feng Chen¹, and Xuchao Yang²

¹Zhejiang Institute of Meteorological Sciences, Zhejiang Meteorological Bureau, China (wmw412@hotmail.com)

²Ocean College, Zhejiang University, Zhoushan, China

The impact of urbanization and the sensitivity of urban canopy parameters (UCPs) on a typical summer rainfall event in Hangzhou, China, is investigated using three groups of ensemble experiments. In this case, urbanization leads to higher temperatures, lower mixing ratios, lower wind speeds before precipitation, and more precipitation in and around the urban area. Both the thermal and dynamical effects of urbanization contribute to an increase in temperature and precipitation, with thermal effects contributing 71.2% and 63.8% to the temperature and precipitation increase, respectively, while the thermal and dynamical impacts cause the opposite changes to the mixing ratio and wind speed. Compared to the other three meteorological elements, the model has the largest uncertainty in the simulation of precipitation, which includes the sensitivity of the different parameterization schemes to the simulation of precipitation in urban areas, and the uncertainty brought by the urban effect on precipitation is not confined within the city but extends to the surrounding areas as well. Temperature and mixing ratio are more sensitive to thermal-related UCPs, while the wind speed is mainly affected by the structural parameters. These variations, however, are sometimes contradictory to precipitation changes, which further adds to the complexity of precipitation simulation.