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Impact of Urban Land-Use Change in Eastern China on the East Asian Subtropical Monsoon: A Numerical Study

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The effect of urban land-use change in eastern China on the East Asian subtropical monsoon (EASTM) is investigated by using the Community Atmosphere Model version 5.1. Comparison of the results between the urban expansion and reference experiments show that with the urban expansion, the land surface energy balance alters: surface net radiation and sensible heat fluxes enhance while the latent heat fluxes reduce. As a result, a significant increase in surface air temperature over eastern China is detected. The urban land-use change contributes to a change in the zonal land-sea temperature difference (LSTD), leading to a delay in the time when LSTD changes from positive to negative, and vice versa. Additionally, the onset and retreat dates of the EASTM are also delayed. Meanwhile, the rise in surface air temperature leads to formation of abnormal northerly air flows, which may be the reason for the slower northward movement of the EASTM and a more southward location of its northern boundary.
Key words: urban land-use change, the East Asian subtropical monsoon, northern boundary