Content:
Taiwan, especially Taipei (located in northern Taiwan), is experiencing a significant urban heat island effect due to its high population density and the uniqueness of the geographic structure. In order to evaluate the impacts of urbanization and UHI effect over northern Taiwan, a mesoscale model, Weather Research and Forecasting (WRF) model coupled with the Noah land surface model and a 2-D Urban canopy model (UCM2D), was used in this study.

The 2-D Urban canopy model was modified from original 1-D UCM (UCM1D) which already coupled in WRF model. The original UCM1D, the urban fraction (=0.7) and anthropogenic heat (50 watt/m², in this study) are fixed in the simulation domain. We found the original UCM1D model has a tendency to underestimate air temperature in the city center during daytime while overestimated over the rural small town in northern Taiwan. In this study, we generated a new 2-D urban fraction in the simulation domain from a very high resolution of observed urban fraction (100 m resolution). Moreover, a new 2-D anthropogenic map is built from a 100 m resolution of building density in Taipei. By using this new WRF/UCM2D coupled model, it has significantly improved our simulation results for the diurnal variation during heat waves in Taipei. The preliminary results of future warming in northern Taiwan simulated by WRF/UCM2D nested with ECHAM5/MPIOM also discussed in this study.

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