Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.15396

Urban effect on precipitation – a case study over Houston

ZHINING TAO[1] AND MIAN CHIN[2]

[1]Morgan State University
[2]NASA GSFC

Presenting Author: zhining.tao@nasa.gov

Urban spaces occupy 0.5% of the world's total land but concentrate more than 50% of the global population. The consequent economic and social activities have made urban a unique landscape, which creates a special microenvironment that affects atmospheric boundary layer processes and precipitation. Meanwhile, concentrated human activities usually make urban more polluted than the surrounding areas with elevated aerosol levels. The radiative and microphysical effects of aerosols would also impact cloud and precipitation developments. The direction and magnitude of such urban effect on local precipitation and storm remain an open scientific question. In this study, a fully coupled regional chemistry transport model – the NASA Unified Weather Research & Forecasting (NU-WRF) model with the updated aerosol scheme – has been applied to the Houston metropolitan area to untangle the complex interactions among urban landscape, aerosols, and precipitation. The simulation results have been evaluated against the measurements of local meteorology and air quality. A series of sensitivity experiments have been conducted to quantify the effect of characteristics of urban land vs. airborne aerosols on local precipitation onset and intensity.