

6B.6 Microclimate of new developed coastal urban area revealed in high-resolution WRF model with high-density observations assimilated

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This paper studies the creation of the microclimatography of the newly developed major urban (Shenzhen) area in the South China coastal region using the NCAR WRF-RTFDDA (four-dimensional data assimilation) technology, i.e. Climate-FDDA. Also studied is the impact of FDDA on improving the accuracy of this microclimate downscaling. The microclimate analysis database is used to investigate the flows and other weather features forced by the land-sea contrast and urban effect at Shenzhen area.

A Climate-FDDA system containing four nested domains with grid sizes of 27, 9, 3 and 1 km, respectively, has been formulated and running for the Shenzhen area. A six-year high-resolution and high-fidelity micro-climate reanalysis database has been generated with the uniquely high-density observations assimilated through the Climate-FDDA continuous four-dimension data assimilation algorithm. Two experiments were conducted with a six-year run using CFSR (climate forecast system reanalysis) as boundary conditions, as one experiment with FDDA and another one without. Impact of data assimilation on the climate analysis and climate dynamical downscaling is investigated with observed station data in terms of traditional statistical metrics for both domain averaged and individual stations. The results indicate that the analysis surface fields from FDDA consistently outperform the results from the experiment without FDDA for all the cycles examined. The analysis of high-resolution simulations implies a significant advantage of the new system in reproducing the microclimate processes, such as city heat island, land/sea breezes and upslope/downslope flows.