

Implementation of the Unified Representation of Moist Convection in the Gray Zone CWBGFS

Chun-Yian Su¹, Chien-Ming Wu¹, Wei-Ting Chen¹ and Jen-Her Chen²

1 Department of Atmospheric Sciences, National Taiwan University, Taipei city, Taiwan

2 Central Weather Bureau, Taipei city, Taiwan

This study implements the unified parameterization (UP) in the gray zone Central Weather Bureau Global Forecast System, which aims to generalize the representation of moist convection between conventional general circulation and cloud-resolving models, in order to better represent the variability associated with aggregated convection. The generalization is based on reducing the effect of parameterized convection according to the diagnosed convective updraft fraction (σ). Two simulations are carried out to investigate the impacts of the UP on the short-term hindcasts and associated aggregated convection, which uses the relaxed Arakawa-Schubert scheme (RAS) and the same scheme with the UP (URAS), respectively. The result shows that the UP gives rise to the evolution of grid-scale convection, contributing to the stronger extreme precipitation, the less rain weaker than 10 mm h⁻¹, the weaker diurnal amplitude and the smoother diurnal variation of precipitation over land in the URAS. It is also found that the UP has the greater impact on the larger convective system, supported by piggybacking the diagnosis of σ to the RAS. In conclusion, the UP increases the variability of grid-properties associated with aggregated convection, and better represents the difference in characteristics between various size ranges of convective system.

Key words: moist convection, gray zone, unified parameterization

References

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