發展GCE暖雨雙矩量微物理參數化方案:
理想與真實個案測試

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摘　　要

本研究嘗試將目前台灣地區常用於模擬及預報之 GCE 雲微物理參數化方案，藉由增加暖雨過程之總水相粒子濃度(雲水與雨水)，將其從原先的單矩量(GCESM)，轉化為暖雨過程雙矩量形式(GCEDM)。為了評估此暖雨雙矩量之 GCE 微物理參數化方案在模式中的降雨表現與預報能力，故分別以一 3D 理想對流胞實驗，以及一暖雨過程主導之真實臺灣降水個案，來與不同之微物理參數化方案進行比較。理想實驗結果顯示，GCEDM 在對流胞成長與降水特性上成功維持與 GCESM 相似表現的同時，GCEDM 亦成功在模擬中提供更富變化之雨水總粒子濃度。真實個案上，GCEDM 整體則是表現出了比 GCESM 更好的降水預報能力，特別是在強降雨區域發生暖雨過程主導之降水時，GCEDM 對於原先 GCESM 中的降水過報情形有明顯改善。

關鍵字：雙矩量方案、雲微物理參數化

Modification of GCE Microphysics Scheme to Warm Rain Double-moment : idealized and real cases study

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Abstract

This study aims to modify GCE microphysics scheme, which is the widely used microphysics scheme for simulations and forecasts around the world, from single-moment (GCESM) to warm-rain double-moment scheme (GCEDM) by appending total number concentrations of cloud water and rain water. To examine the performance of GCEDM, it was evaluated and compared to different microphysics schemes by a 3D idealized supercell experiment and a warm-rain processes dominant real case over Taiwan. For 3D idealized supercell experiment, it shows that GCEDM maintains similar supercell structure and rainfall characters from GCESM successfully. Also, GCEDM provides more various rain number concentration in simulation. On the other hand, for real case, it shows that GCEDM had better forecast skill compared to the GCESM, especially for the warm-rain processes dominant situation in heavy rainfall region.

Keywords: Double-moment, Microphysics parameterization