

# 中央氣象局FV3GFS雲微物理測試研究 Microphysics Study in CWB FV3GFS

陳郁涵<sup>1,3</sup> (Chen Yu-Han) 蕭玲鳳<sup>1</sup> (Hsiao Ling-Feng)  
陳建河<sup>2</sup> (Chen Jen-Her) 郭鴻基<sup>3</sup> (Kuo Hung-Chi)

<sup>1</sup>中央氣象局氣象科技研究中心 <sup>2</sup>中央氣象局氣象資訊中心 <sup>3</sup>國立臺灣大學大氣科學系  
<sup>1</sup>Research and Development Center, Central Weather Bureau  
<sup>2</sup>Meteorological Information Center, Central Weather Bureau  
<sup>3</sup>Department of Atmospheric Sciences, National Taiwan University

## 摘 要

中央氣象局自1983年開始發展數值天氣預測技術，至今已累積近40年的發展經驗，並於近年引進美國國家環境預報中心（NCEP）之社群模式。Finite Volume Cubed-Sphere Dynamical Core（FV3）為NCEP目前作業用之全球預報系統(GFS)。過去三年內，中央氣象局已成功在高速電腦上建置水平解析度C384T（約25公里）的FV3GFS，並於臺灣區域使用巢狀網格（約4.8公里）以提高預報解析度。本研究參考NCEP作業版本之雲微物理程式，透過調整GFDL雲微物理在雲冰終端速度及雲冰有效半徑的計算方法，嘗試改善冬季溫度預報的冷偏差現象。模式測試時段為2020年11月，於每日00Z進行五天預報，分析模式對水冰相粒子的預報表現，並與臺灣地面測站之溫度觀測資料進行校驗。詳細結果將於研討會中說明。

**關鍵字：**中央氣象局 FV3GFS、數值天氣預報、雲微物理、溫度冷偏差

## Abstract

Central Weather Bureau (CWB) has cultivated the technique for numerical weather prediction since 1983, and followed up the community model approach from National Centers for Environmental Prediction (NCEP) in the recent years. The Finite Volume Cubed-Sphere Dynamical Core (FV3) global model is currently used as NCEP Global Forecast System (NCEPGFS). In the past three years, CWB had successfully built FV3GFS with C384T (25-km resolution) in high-performance computing and a nested domain (4.8-km resolution) around Taiwan. In this study, in order to improve the forecast performance of temperature cold bias in winter, the formulas of ice fall speed and ice cloud effective radius in GFDL microphysics scheme are modified by referring the operational version of NCEPGFS. Five-day forecasting experiments start at 00Z every day during November 2020. The ice- and water-phase species, including cloud ice, snow, graupel, cloud water, and rain, are predicted and compared in detail. Besides, the forecast performance of temperature in Taiwan is verified with the observations from the ground stations. More details will be presented in the conference.

**Keywords:** CWB FV3GFS, numerical weather prediction, microphysics, temperature cold bias