

FV3GFS全球預報系統於氣象局之資料同化 進展與作業化測試

The Progress of Data Assimilation and Operational Test of the FV3GFS Global Forecast System at CWB

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摘 要

中央氣象局已規劃使用美國國家環境預報中心 (NCEP) 的新一代有限體積法立方網格全球預報系統 (Finite-Volume Cubed-Sphere Global Forecast System; FV3GFS) 作為其作業全球數值天氣預報模式，取代現行作業的CWBGFS模式，且資料同化採用Gridpoint Statistical Interpolation (GSI) 之混成系集變分同化 (hybrid EnVar) 系統。本報告將概要介紹關於此系統的幾項資料同化工作，包括合併使用混成四維系集變分同化法 (4DEnVar) 與時間延遲系集 (time-lagged ensemble)、福爾摩沙衛星七號掩星資料同化、Ensemble Forecast Sensitivity to Observation Impact (EFSOI) 觀測影響診斷法、與混成增益矩陣 (hybrid gain) 資料同化方法等。亦將介紹過去幾個月執行作業性循環資料同化與預報測試的結果，顯示以FV3GFS系統進行準作業，在其模式解析度 (25公里) 較現行作業CWBGFS的模式解析度 (15公里) 低，以及排除使用現行作業中使用之ECMWF模式虛擬 (bogus) 資料的情況下，可達到與現行作業CWBGFS系統大致相當的表現，而未來仍有持續改進的空間。預計氣象局的FV3GFS系統將於明年新一代高速運算電腦購置完成後上線作業。

關鍵字：FV3GFS、資料同化、全球預報系統

Abstract

Central Weather Bureau (CWB) has planned to use the U.S. NCEP's new generation Finite-Volume Cubed-Sphere Global Forecast System (FV3GFS) for its operational numerical weather prediction, replacing the current operational CWBGFS model. The Gridpoint Statistical Interpolation (GSI) hybrid ensemble-variational (hybrid EnVar) system is used for the data assimilation. This presentation will briefly introduce several work regarding the data assimilation in the FV3GFS, including the combined use of the hybrid 4-dimensional ensemble-variational method (4DEnVar) and the time-lagged ensemble, the FORMOSAT-7/COSMIC-2 radio occultation data assimilation, the Ensemble Forecast Sensitivity to Observation Impact (EFSOI) method, and the hybrid gain data assimilation method. The operational test results of the cycled data assimilation and forecast conducted in the past several months will also be presented. The semi-operation using the FV3GFS, despite its lower model resolution (25 km) compared to the current operational CWBGFS (15 km) and the discarding of the ECMWF bogus data assimilated in the current operation, can reach a roughly similar performance as the current operational CWBGFS, while there are still room for improvement for the FV3GFS. The FV3GFS system at CWB will be in operation after the completion of the construction of CWB's new high-performance computer in the next year.

Key words: FV3GFS, data assimilation, global forecast system

