同化福衛七號掩星觀測對2020年台灣地區梅雨及颱風模擬影響評估

The Impacts of FORMOSAT-7/COSMIC-2 Radio Occultation Observations on the Simulations of Meiyu and Typhoon around Taiwan in 2020

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摘　要

福爾摩沙衛星七號（簡稱福衛七號，FORMOSAT-7/COSMIC-2）於2019年6月順利發射成功，並於2020年3月正式對外公開即時觀測資料，國家災害防救科技中心亦同時開始自台灣科學資料處理中心（Taiwan Analysis Center for COSMIC; TACC）下載即時掩星觀測資料應用於防災的天氣監控與模擬作業。以福衛七號觀測建立梅雨監控指標，顯示其與傳統由分析場建立的指標有相當一至的趨勢。同化福衛七號掩星折射率觀測，對於2020年梅雨期間降雨預報得分有中性偏正面影響。對於2020年影響台灣的哈格比颱風路徑預報，福衛七號觀測亦能帶來正面效益。個案的實驗顯示，同化福衛七號觀測改善模式颱風的結構，透過多次循環的同化策略，能使福衛七號觀測更快且更顯著的影響模式御報。

關鍵字：福衛七號, 無線電掩星, 梅雨, 哈格比颱風

Abstract

The FORMOSAT-7/COSMIC-2 (F7/C2) had been launched successfully in June 2019, and the real-time radio occultation (RO) data have been open to the public since March 2020. The National Science and Technology Center for Disaster Reduction (NCDR) has downloaded the real-time data hourly from Taiwan Analysis Center for COSMIC (TACC) for operational weather surveillance and forecasting. This study suggests a moisture indicator using the F7/C2 RO observations and evaluates numerical model experiments with RO data assimilation. The suggested moisture indicator accurately monitors daily moisture variations in the South China Sea and the Bay of Bengal throughout the 2020 monsoon rainy season. For the numerical model experiments, the statistics moisture and rainfall forecasts for the 2020 Meiyu season in Taiwan show a neutral to slightly positive impact brought by RO data assimilation. The statistics of track forecasts for typhoon Hagupit (2020) also show the positive effect of RO data assimilation. A forecast sample reveals that the member with RO data assimilation simulates better typhoon structure and intensity than the member without, and the effect can be larger and faster via multi-cycle RO data assimilation. .

Key words: FORMOSAT-7/COSMIC-2 (F7/C2), Radio Occultation (RO), Meiyu, Typhoon Hagupit