

# 向日葵8號衛星之輻射觀測資料 於氣象局全球模式之應用

## Assimilation of Himawari-8 Radiance Data in CWB's Global Forecast System

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### 摘 要

向日葵8號 (Himawari-8) 地球同步衛星裝載先進向日葵成像儀 (Advanced Himawari Imager; AHI), 可感應紅外線、近紅外線、可視波長共16個頻段之輻射成像, 提供東亞與西太平洋區域持續不間斷之衛星輻射觀測。本研究透過資料同化技術將此資料應用於氣象局全球天氣預報模式中。氣象局衛星中心由日本接收向日葵8號衛星資料原始資料, 並進行資料處理, 包括晴空 (clear-sky) 篩選與資料稀疏化 (thinning) 等, 產製同化所需之資料。在較早之研究中, 我們以氣象局CWBGFS作業模式同化紅外線頻段之晴空輻射資料, 利用 Desroziers et al. (2005) 方法重新估計AHI觀測誤差與頻道間誤差相關性 (inter-channel error correlation) 作為頻道選取依據, 實驗結果顯示對預報為中性偏正面影響。由於氣象局即將以基於FV3GFS (Finite-Volume Cubed-Sphere Global Forecast System) 的新一版全球數值天氣預報系統作為作業系統, 我們進一步在FV3GFS中同化AHI紅外線頻段水氣窗區3個頻道之輻射觀測資料, 初步結果顯示對大部份變數與區域為中性, 但在熱帶地區500 hPa以下溫度場可見略為正面的改善。我們將持續進行在FV3GFS上的AHI同化測試, 以增進對模式預報的改善。

**關鍵字:** 向日葵衛星8號、AHI輻射資料同化、晴空輻射資料

### Abstract

The Himawari-8 geostationary satellite equips the Advanced Himawari Imager (AHI), which is able to take continuous observations over the East Asia and West Pacific Ocean areas with 16 bands including visible, infrared and near-infrared bands. This study assimilates the AHI radiance data in CWB's global forecast systems. The Himawari-8 raw data are received from Japan by the Meteorological Satellite Center of CWB, which also conducts the data processing, such as cloud mask scheme and data thinning, to produce the data for assimilation. In an earlier study, we assimilated the clear-sky infrared bands AHI data with the operational CWBGFS model. The observation errors for the AHI data were re-estimated by the Desroziers et al. (2005) method as well as the inter-channel error correlations, which were used for the channel selection. It showed neutral-to-slightly-positive impacts on the model forecast. Because CWB has planned to use the FV3GFS (Finite-Volume Cubed-Sphere Global Forecast System) as its next operational global NWP system, we also conduct the AHI data assimilation study with the FV3GFS system, assimilating three water vapor bands. Preliminary results show neutral impacts for most of the variables and regions, whereas a slightly positive impact is observed in the temperature field below 500 hPa. We will be working on the AHI data assimilation with the FV3GFS system to better improve the model forecast.

**Key words:** Himawari-8, AHI data assimilation, clear-sky radiance