

Assimilation impact of the FORMOSAT-7/COSMIC-2 GNSS radio occultation data with the CWB Global Forecast System

Chung-Han Lin, Zih-Mao Huang, Wen-Hsin Teng, Guo-Yuan Lien, Jen-Her Chen

Central Weather Bureau, Taipei, Taiwan

Abstract

The FORMOSAT-7/COSMIC-2 Global Navigation Satellite System (GNSS) Radio Occultation (RO) satellite constellation was launched on June 2019. It operates in low-inclination orbits at 550 km height and gathers more than 4,000 RO profiles between 50 degree north and south latitudes per day.

The Central Weather Bureau (CWB)'s Global Forecast System (CWBGFS) has assimilated the GNSS RO data since the FORMOSAT-3/COSMIC, and shown positive impacts to the model forecast at high level. In May 2019, CWBGFS started assimilating the local bending angle instead of the local refractivity for the GNSS RO data, and this modification led to a neutral or positive impact to the model forecast.

Since July 2019, the assimilation impact of the FORMOSAT-7/COSMIC-2 data has been studied by a parallel semi-operational experiment additionally assimilating the FORMOSAT-7/COSMIC-2 data. Consistent positive impact to the global forecast skills has been observed since the start of the parallel experiment, with the largest impact found in the tropical region, well reflecting the orbital design of the satellites. The average track forecast errors for North Western Pacific typhoons during the study period are not significant. This study concludes the usefulness of the FORMOSAT-7/COSMIC-2 data in global numerical weather prediction and leads to the operational use of the data at CWB tentatively scheduled from August 2020.