Synthetic satellite imagery from CWAWRF forecasts and its potential utility

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Abstract

Synthetic satellite imagery is produced by running a forward radiative transfer model that is capable of generating realistic satellite radiances using output from an NWP model. Many operational weather centers and research institutes have been providing synthetic satellite imagery as an NWP product. One of the key advantages of synthetic satellite imagery is that it provides an integrated perspective of the 3-dimensional atmosphere that includes clouds (and aerosols, if properly addressed). When used in weather forecasting, trained forecasters can use the same techniques that were used to evaluate real satellite imagery to monitor trends in synthetic satellite imagery and assess their confidence on model forecasted weather events such as thunderstorm development. On the other hand, synthetic satellite imagery also plays an important role in NWP development. First of all, generating realistic synthetic satellite images is the key step in assimilating satellite radiances into an NWP model. Secondly, it is useful to evaluate model skills in predicting clouds and identify errors in NWP and/or forward models by comparing synthetic satellite imagery with the real one. In this study, synthetic satellite images of Advanced Himawari Imager (AHI) onboard the geostationary satellite Himawai-8/9 are being generated from the CWAWRF for the first time. By interfacing the CWAWRF with the NCEP Unified Post Processor (UPP) package that incorporates the Community Radiative Transfer Model (CRTM), synthetic satellite images of other sensors aboard a variety of satellites can also be generated from CWAWRF. In this presentation, an overview of this effort and a preliminary evaluation of the synthetic satellite imagery from CWAWRF will be discussed.

Key words : Synthetic satellite imagery, radiative transfer model, NWP, Himawari, AHI