

On the importance of assimilating cloudy-sky infrared radiances from Himawari-8 for heavy rainfall prediction

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Recently, the Japan Meteorological Agency (JMA) and the National Oceanic and Atmospheric Administration (NOAA) started operations of their new-generation geostationary satellites Himawari-8 (Bessho et al. 2016) and GOES-16 (Schmit et al. 2017), capable of observing visible and infrared images at high spatiotemporal and spectral resolution. In particular, their infrared (IR) radiance observations are expected to improve numerical weather prediction (NWP) via data assimilation (DA), because IR radiances contain information on clouds and moisture. Our recent studies (Honda et al. 2018a, b) demonstrated that frequent assimilation of all-sky Himawari-8 infrared radiances improved forecasts of a tropical cyclone and a heavy precipitation event in Japan. Although they have shown the advantages of every 10 minutes DA of Himawari-8 data, they have not clearly discussed the importance of assimilating both clear-sky and cloudy-sky radiances. In this follow-up study, we conduct additional experiments assimilating only clear sky radiances every 10 minutes. Preliminary results show that assimilating only clear-sky radiances is not sufficient to obtain improved precipitation forecasts. Therefore, to improve precipitation forecasts by using Himawari-8, it is essential to assimilate cloudy sky radiances in addition to clear sky radiances.

Keywords: Data assimilation, Himawari-8, Heavy rainfall