

Assimilation of Satellite Soil Moisture Contents and Clear-sky Radiance in Operational Local NWP System at JMA

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The Japan Meteorological Agency (JMA) operates the Local NWP system constructed with the high-resolution Local Forecast Model (LFM) and Local Analysis. LFM and Local Analysis are run hourly and various types of the latest observation are assimilated.

JMA started to assimilate the satellite observation of clear-sky radiance (CSR) and soil moisture content (SMC) in the Local NWP system in January 2017. The assimilated radiance data are CSR observation from Himwari-8 AHI, GPM GMI, GCOM-W AMSR2, Metop-A/B AMUS-A/MHS and DMSP SSMIS. And the assimilated SMCs are those of L2-products from GCOM-W AMSR2 and Metop-A/B ASCAT. These SMC are assimilated after variable transformation using cumulative distribution function (CDF) matching method. The CDF matching method fits the probability density function (PDF) of observation to the PDF of model variables. This pre-conditioning by CDF matching helps to minimize the cost function because the innovation of SMC becomes Gaussian after the CDF matching. However, it is known that the observation bias of satellite fluctuate over time. To remove adaptively such bias of the secular changes, the variational bias correction method is adopted in the Local Analysis. As a result, both the CSR and SMC can be assimilated as unbiased observation and the forecast accuracy of atmosphere and surface is improved. The impact of these satellite data assimilation will be presented.