Development of all-sky assimilation of 183 GHz microwave radiance data in the JMA global NWP system

*Masahiro Kazumori[1]

1. Japan Meteorological Agency

Assimilation of cloud- and precipitation-affected microwave radiance data is essential to obtain accurate initial fields for numerical weather prediction (NWP). All-sky assimilation of microwave imager radiance was developed in the Japan Meteorological Agency (JMA) global NWP system. The results of the data assimilation experiments showed the improved total column water vapor fields and lower tropospheric wind fields in the analysis and forecast. Improved tropical cyclone track and intensity predictions were also confirmed. At present, to extend the all-sky assimilation capability, the development of microwave humidity sounding data assimilation under all-sky conditions is in progress.

The major information of the microwave imager observation comes from microwave emissions of atmospheric water vapor, clouds and precipitation. However, in high frequency range of the microwave spectrum, scattering effects of microwave radiation with clouds and precipitation particles play a dominant role in the observed radiances. Therefore, the performance of microwave radiative transfer model (RTM) used in the data assimilation and the representation of cloud ice and/or solid precipitation in the input atmospheric profiles for RTM affect the quality of analysis and forecast in the NWP system. In this study, various microwave humidity sounding radiances observed at microwave 183.31 GHz water vapor absorption line are used (e.g. MHS, GMI, SAPHIR, SSMIS, ATMS, MWHS-1, MWHS-2) to reveal insufficient representation of the input atmospheric profiles or performance of RTM. As RTM, RTTOV-SCATT is used. Results of the comparison of the observation and the simulation showed the forecast model’ s deficiency of cloud ice and/or solid precipitation representation under convective cloud conditions. The detail results are presented in the conference.

