Impact of all-sky microwave radiance assimilation on typhoon forecasts in JMA global NWP system

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Space-based microwave radiance observations provide essential information for today’s numerical weather prediction (NWP). The data contain information on atmospheric water vapor, cloud and precipitation under clear and cloudy conditions. In order to use the information, an all-sky microwave radiance assimilation method for the JMA global data assimilation system has been developed. In the all-sky assimilation, several microwave imagers’ radiance data (e.g. AMSR2/GCOM-W, GMI/GPM and SSMIS/DMSP) were evaluated and their first guess (FG) departures (observed radiance minus simulated radiance) were examined. The all-sky FG departure statistics revealed biases originated from cloud physics scheme of the JMA global model. Results of assimilation experiments indicate that there are excessive light rain areas forecasted in the tropics and cloud liquid water amounts are underestimated in stratocumulus areas. These biases in the FG departure are issues in the all-sky radiance assimilation at JMA. Furthermore, the assimilation showed an undesirable impact as a decrease of analyzed mean water vapor amount. However, in spite of these issues, preliminary experiment of the all-sky microwave radiance assimilation showed positive impacts on tropical cyclone track prediction, intensity prediction and made better FG fit to wind and humidity observations. In the tropical cyclone cases, analyzed water vapor fields and forecasted precipitation features became much realistic than those of in clear sky assimilation. Comparisons of the all-sky radiance assimilation and the clear-sky assimilation for several typhoon cases are presented in the conference.

Keywords: Numerical Weather Prediction, microwave radiance, data assimilation

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