10.11 VERIFICATION OF PRECIPITATION CHARACTERISTICS FOR WARM AND COLD SEASON USING GPM AND GROUND INSTRUMENTS IN KOREAN PENINSULA

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The GPM (Global Precipitation Measurements) DPR (Dual-frequency precipitation radars) and GPM Microwave imager (GMI) can observe the precipitation system of mid- and high-latitude regions continuously. These measurements enable the property analysis of seasonal precipitation including rainfall and snowfall in the whole area of Korean peninsula. Besides, the dense ground radars (GRs) and gage networks (GNs) are operated by various institutions to generate the precipitation maps suitable for Korea. The ground validation of GPM is essential and is still challenging issue for different types of precipitation. In this study, we investigate the statistical properties of GPM validation in rain and snowfall cases based on these observation databases.

The time synchronization is first carried out using the central observation time of the GPM passing through the observation domain of Korean peninsula. The databases such as estimated precipitation intensity of GPM are then interpolated into digital forecast system (DFS) coordinates for direct comparison to those of GRs. For GRs, the Hybrid Surface Rainfall (HSR) and constant altitude plan position indicator (CAPPI) method is used to analyse precipitation intensity and vertical structure of systems. To convert the rainfall and snowfall intensity from calibrated reflectivity, we used the Z-R (or S) relationship $Z=219R^{1.36}$ and $Z=75S^{2.0}$. The comparison process between GPM instruments and GNs is also performed considering the spatiotemporal scales. Finally, we conduct the verification using statistical indices consisting of mean bias, root mean square errors (RMSE) and correlation coefficient (CORR).

For most of rainfall cases, the reflectivity measurements of GPM DPR are 3˜5 dB higher than GRs. The uncertainties of statistic indices for precipitation are reduced in the large spatiotemporal scales. Snowfall observations based on reflectivity of GPM are underestimated than those of GR at snowfall intensity above 1 $mmhr^{-1}$.