Stepwise inter-comparison of radar rainfall products: Effects of quality controls, radar calibration, estimators, QPE methods, and gage adjustment

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The accurate retrieval of rainfall information can be achieved by painstaking multi-steps processes such as specification of radar hardware, stable operation and calibration, proper quality control, meteorological correction, proper estimators, gage adjustment, etc. In this study, we have systematically evaluated the performance of different algorithms that are used in the Intercomparison Campaign of Radar Rainfall Estimation organized by Korea Meteorological Administration (KMA).

The targeted area is the coverage of Mt. Bisl dual-polarimetric radar operated by The Han Flood Control Office, Ministry of Land, Infrastructure and Transport (MOLIT). Three different methods (two fuzzy methods and one neural network technique) of quality control are used. The calibration of reflectivity and differential reflectivity is performed by the self-consistency constraint, intercomparison among radars, and vertical pointing. The rainfall estimation from CAPPI and OSR (Optimal Surface Rainfall) maps is also evaluated. In addition, we have evaluated the effect of different rainfall estimators and gage adjustment.

The results show that the cluttering filtering in the signal processing level reduces the radar reflectivity, thus leading to systematic underestimation of R. The locally optimized fuzzy logic algorithm performs better than techniques of neural network and NEXRAD ORPG algorithm. The calibration using the dual-pol. self-consistency significantly improves the accuracy of rainfall. In addition, the recently deployed dual-polarimetric radar showed the best accuracy compared with the existing KMA radar network. In terms of QPE methods, the OSR performs better than CAPPI or PPI techniques. We will show further interesting results.