Comparison of Optimal Rainfall map with CAPPI

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Radar observation in complex terrain suffers with severe beam blockage and ground clutter. Constant Altitude Plan Position Indicator (CAPPI) does not consider the height of terrain, precipitation growth, and possible contamination of radar data, thus leading to significant uncertainty in CAPPI-based QPE. In this study, we develop the rainfall maps, so-called Hybrid Surface Rainfall (HSR) map, by selecting the lowest observable height from multiple elevation angles and this map is compared with the typical CAPPI QPE.

The Han Flood Control Office, Ministry of Land, Infrastructure and Transport (MOLIT) has been operating the S-band dual-polarization radars since 2009. These radars scan the six elevations angles from the lowest elevation angle of -0.5° to the highest elevation angle of 1.6°. The HSR map selectively chooses the lowest observable precipitation pixels among these angles. This technique combines not only average ground echo map and simulated beam blockage but also information on non-precipitation echoes. The non-precipitation echo is identified using the spatial characteristic of dual-polarimetric measurable (reflectivity, differential reflectivity, differential phase shift, and correlation coefficient). Thus, the HSR map change dynamically according to radar observation.

The results are evaluated with rainfall accumulation from the automatic weather stations of Korea Meteorological Administration (KMA) and raingauges within Kyungpook National University (KNU) located at the range of about 23 km from Mt. Bisl S-band dual-pol. radar. We analyzed the rainfall errors with ranges from radar and spatial characteristics of these errors.