

# **Precipitation estimation over radar gap areas based on satellite and adjacent radar observations**

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Continuous rainfall measurements from ground-based radars are crucial for monitoring and forecasting heavy rainfall-related events such as floods and landslides. However, complete coverage by ground-based radars is often hampered by terrain blockage and beam-related errors. In this study, we presented a method to fill the radar gap using surrounding radar-estimated precipitation and observations from a geostationary satellite. The method first estimated the precipitation over radar gap areas using data from the Communication, Ocean, and Meteorological Satellite (COMS). The initial precipitation estimation from COMS was based on the rain rate-brightness temperature relationships of a-priori databases. The databases were built with the temporally and spatially collocated brightness temperatures at four channels (3.7, 6.7, 10.8, and 12  $\mu\text{m}$ ) and radar rain rate estimations. The databases were updated with collocated datasets in a timespan of approximately one hour prior to the designated retrieval. Then, bias correction based on an ensemble bias factor field from radar precipitation was applied to the estimated precipitation field. Over the radar gap areas, this method finally merged the bias corrected satellite precipitation with the radar precipitation obtained by interpolating the adjacent radar observation data. The merging was based on the optimal weights that were determined from the root-mean-square error (RMSE) with the reference sensor observation or equal weights in the absence of reference data. The results suggested that successful merging appears to be closely related to the quality of the satellite precipitation estimates.

The developed merging method is also applied to the precipitation estimation over the yellow sea where radar observations are not available. In the merging, the precipitation fields from the KLAPS (Korea Local Analysis and Prediction System) are additionally introduced. The occasional discontinuity around the boundaries of the radar observations and the merged precipitation areas are mitigated by setting a buffer zone. The merged precipitation fields are then compared to independent satellite precipitation products.