13.46 AN EVALUATION OF RAIN RADAR ADJUSTMENT PROCEDURES

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Several adjustment procedures that merge rain radar grids with observed precipitation rates from point locations have been developed over the past two decades, providing improved rainfall grids. Point observations of precipitation rates typically come from rain gauges, but can also include data derived from signal attenuation between commercial microwave link (CML) antennas. Past research has validated the various adjustment procedures under specific conditions, including a given density of observation points, a certain storm event, and a known error level of radar grids and sensors. However, to the best of the authors knowledge, no generic evaluation process has been demonstated that can address the wide variety of conditions that must be taken into account in choosing the most suitable adjustment procedure for any given situation.

This research evaluates several of the accepted adjustment algorithms under a variety of scenarios. Each scenario is composed of a particular type of storm, a density of sensors (gauges and CML derived rain rates), and an assumed error level applied to the CML based precipitation rates. The evaluation simulates a scenario by creating a set of synthetic data: storm grids, radar grids and sensor locations. This simulation is run repeatedly for each scenario with varying random number seeds, and the different adjustment algorithms are applied to each run. Then average correlations between each of the adjusted rain grids and the initial true storm grid are calculated using non-parametric tests.

Comparison of these average correlations for different adjustment procedures under different scenarios indicates the following preliminary results. Rain radar from stratiform storm fronts is not well adjusted by any of the adjustment procedures. The multiplicative and mixed (additive with multiplicative) adjustment procedures show moderate success with this type of storm when density of the sensors is high, independent of the sensor error levels. Adjustment of radar from convective type storms attains high correlation when applying either a mixed (additive and multiplicative) or conditional merge adjustment algorithm. Both of these methods perform optimally when density of the sensors is high, regardless of the sensor error levels. The mean field bias adjustment shows only moderate correlation, and only when both density of sensors is high and error levels are low.