

Assessing Geostationary Lightning Mapper Data in the GOES-R Rainfall Rate Algorithm

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The GOES-R Geostationary Lightning Mapper (GLM) detects the total lightning rate at high spatial and temporal resolution, providing continuous and nearly uniform real-time measurements of total lightning over the Americas and adjacent oceanic regions. In this study, the GLM-derived flash extent density (FED), average flash area (AFA), minimum flash area (MFA), and total optical energy (TOE) are employed as additional predictors for rainfall estimation in the Enterprise GOES-R Rainfall Rate Algorithm. The impacts of the GLM data were evaluated against Multi-Radar Multi-Sensor (MRMS) data over the Conterminous US (CONUS) during a 12-month test period. The impacts included reductions of several percent in the total volume of missed rainfall and false alarm rainfall, as well as a slight reduction in dry bias for light to moderate (below 15 mm/h) rain rates. Surprisingly, for areas covered by both satellites, the improvements for GOES-16 were generally greater than for GOES-17. This was unexpected because the GOES-17 version of the algorithm only uses a single IR band because of instrument cooling issues and thus has less skill than the 5-band GOES-16 version.