



## **An investigation of a new dual-polarization weather radar data model for lightning nowcasting and warning**

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Accurate and extended short-term automated forecasting (nowcasting) of lightning is important for the preservation of life and resources in many applications. A new dual-polarization weather radar data model for lightning nowcasting and warning is presented and described. Previous research has shown that a simplified radar-based ice mass estimator provides value in lightning nowcasting and warning. This new product estimates the mass of graupel aloft, a quantity shown to be a key component in the atmospheric electrification process. The mass of graupel in the charge region of the storm is estimated by a model comprised of integrated reflectivity above the environmental freezing level, classification of graupel regions by a new hydrometeor classification algorithm, and coefficients determined by bulk microphysics studies. Data from storm events collected by the KFWS WSR-88D and National Lightning Detection Network in the Dallas-Fort Worth urban area in 2014 are used for analysis. Nowcasting is done using an area-based approach called the Dynamic and Adaptive Radar Tracking of Storms, where storm motion is estimated using a Fourier-based linear model. Nowcasts are then generated by advecting the data fields ahead in time according to these estimated motion vectors. Warning verification in the 0–1 h lead time frame is performed using a grid-based approach that discerns the performance of first-lightning flash nowcasting at each grid point.