Nowcasting lightning during RELAMPAGO

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The Remote Sensing of Electrification, Lightning, and Mesoscale/Microscale Processes with Adaptive Ground Observations (RELAMPAGO) international field campaign occurred June 1, 2018, to April 30, 2019. This campaign was comprised of more than 150 scientists from 10 organizations. Data was collected to investigate different phases of the life cycle of thunderstorms that occur in Argentina to better understand the physical mechanisms that cause the initiation and growth of organized convective systems in some of the most intense storms on the planet. The main focus of the project was to develop new conceptual models for forecasting extreme weather events that will hopefully lead to reductions in future loss of life and property.

This presentation shows the performance of a recently developed model for estimating ice mass aloft, a key component in the atmospheric electrification process, and a method for nowcasting lightning activity using C-band weather radar and Global Lightning Dataset (GLD360) data from RELAMPAGO. This nowcasting method uses a grid-based approach to make specific forecasts of lightning in space and time. The method estimates ice mass aloft in the region where electrification occurs using a numerical optimization approach to essentially reframe a simplified bulk microphysical model into a completely data-driven model. Previous results using WSR-88D S-band radar data in the United States showed that using this model significantly improved nowcasts of first-flash lightning occurrence versus the traditional weather radar-based ice mass estimator as well as using lightning flash-rate density directly.