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Environmental, kinematic and microphysical conditions leading to anomalous and normal polarity storms in Argentina

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Abstract

Argentinian thunderstorms are among the most severe and most intense flash rate producers in the world. The region of Cordoba in central Argentina, near the foothills of the Sierras de Cordoba (SDC) mountains, is favorable for initiation and rapid intensification of deep thunderstorms and eventual upscale growth. During RELAMPAGO (Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes with Adaptive Ground Observations) Intensive Observation Phase (IOP) held in Cordoba area in November and December 2018, various lightning networks, radars, and radiosondes were deployed in order to characterize those intense storms. A small fraction of storms sampled during the IOP were observed to have a predominance of located LMA sources at a lower height than typically observed for normal polarity storms, characterizing the so-called anomalous polarity storms. Important differences were depicted from sources located by The University of Alabama in Huntsville (UAH) CAMMA (Cordoba Argentina Marx Meter Array), an LF/VLF electric field change network, whose frequency band detection possibly provides a different physical interpretation, hypothesized to better detect positive leaders within negative charge regions than the LMA. In this study, these lightning networks are used to help determine charge regions, how charge regions were initially constructed, and their evolution throughout storms' life cycle. Multi-Doppler analysis, hydrometeor classification using radars, sounding with a high temporal-spatial resolution, and a mesoscale/synoptic characterization are used to determine the necessary conditions for the development of normal and anomalous charge structure storms.

Topic Areas

Cloud Processes, Thunderstorm Electrification and Lightning

Submission Format

Poster