



Lightning activity related to satellite and radar observations of a mesoscale convective system over Texas on 7-8 April 2002

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A multi-sensor study of the leading-line, trailing-stratiform (LLTS) mesoscale convective system (MCS) that developed over Texas in the afternoon of 7 April 2002 is presented. The analysis relies mainly on operationally available data sources, such as GOES East satellite imagery, WSR-88D radar data, and NLDN cloud-to-ground flash data. In addition, total lightning information in three dimensions from the LDAR II network in the Dallas-Ft. Worth region is used. GOES East satellite imagery revealed several ring-like cloud top structures with a diameter of about 100 km during MCS formation. The Throckmorton tornadic supercell which had formed just ahead of the developing linear MCS, was characterized by a high CG+ percentage below a V-shaped cloud top overshoot north of the tornado swath. There were indications of the presence of a tilted electrical dipole in this storm. Also, this supercell had low average CG- first stroke currents and flash multiplicities. Interestingly, especially the average CG+ flash multiplicity in the Throckmorton storm showed oscillations with an estimated period of about 15 min. Later on, in the mature LLTS MCS, the radar versus lightning activity comparison revealed two dominant discharge regions at the back of the convective leading edge, and a gentle descent of the upper intracloud lightning region into the trailing stratiform region, apparently coupled to hydrometeor sedimentation. There was evidence for an inverted dipole in the stratiform region of the LLTS MCS, and CG+ flashes from the stratiform region had high first return stroke peak currents.