

## **Electrification, lightning and microphysics in a simulated, 'bow echo' severe storm**

Jerry M. Straka, Associate Professor  
Atmos. Sci. and Atmos. Physics, School of Meteorology, University of  
Oklahoma, 100 E. Boyd St. rm. 1310 Norman, OK 73019  
PH WK: (405)-325-5503/6561  
PH HM: (405)-447-5595 (try first)  
FAX (405)-325-7689  
E-mail [jstraka@ou.edu](mailto:jstraka@ou.edu)  
[jstraka@rossby.ou.edu](mailto:jstraka@rossby.ou.edu)  
Edward R. Mansell  
CIMMS/Univ. of Oklahoma  
Conrad L. Ziegler,  
National Severe Storms Laboratory  
Donald R. MacGorman  
NSSL  
Matt S. Gilmore  
CIMMS/Univ. of Oklahoma

This study uses a numerical cloud model to examine how the microphysics and the dynamics of 'bow echo' storms affect electrification and lightning production. 'Bow echo' storms produce some of the fiercest and most widespread wind damage of storms in the severe storm spectrum. However, because they have not been studied much with polarimetric radar or lightning mapping systems, we don't know much about lightning production in them or about what can be inferred about them from trends in lightning. Moreover, we don't know if lightning observations might help play a role in operational forecasting the severe weather with these storms as might be possible with supercell storms. In this work we will present an idealized 'bow echo' simulation of lightning, electrification, and microphysics by a three-dimensional numerical model with advanced numerics, microphysics parameterizations, electrification parameterizations, and lightning schemes.

The primary focus will be on electrification and lightning development at the relatively early, large, 'tall echo' stage (after about one hour in the simulation), the development of the start of the 'bow echo' stage (after about three hours), and the severe storm 'bow echo' stage (after about four hours). The three stages represent the times when an operational forecaster might first recognize the possible development of a 'bow echo', the onset of a 'bow echo', and the full blown severe weather stages of the 'bow echo'. Where and how lightning fits into these times is not yet known. Use of an advanced numerical model is one way to help establish hypotheses to help direct future observations to test the hypotheses.