CONTROL ID: 1800434

TITLE: A parallel 3D model of quasi-electrostatic fields above active thunderstorms

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ABSTRACT BODY: Quasi-electrostatic (QE) fields, created by fast (~1 ms) removal of electric charges from a thundercloud, can lead to ionization, heating, and optical emissions at high altitudes (~70 km). Previous studies using numerical solution of these fields in a 2D azimuthally-symmetric cylindrical coordinate system have focused on the vertical transport of the charges from the thundercloud to the ground [Pasko et al. 1995-1997]. However, many potentially important questions such as the effects of the horizontal transport of the charges and also multiple discharges at different locations both on the thundercloud and high altitude environment have not been studied due to the modeling constraints. A more detailed and realistic study of these phenomena requires a three-dimensional model which is computationally more demanding. In this study, we have developed a fully scalable parallel 3D numerical model to solve for the QE fields. The new model has been verified against the cylindrically-symmetric 2D model. We present the results of the new model and discuss the new findings.

KEYWORDS: 3324 ATMOSPHERIC PROCESSES Lightning.

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