

The Quasi-Electrostatic (QE) fields are created by fast (~ 1 ms) removal of electric charges from a thundercloud and can lead to ionization, heating, and optical emissions at high altitudes (~ 70 km). We use a newly developed parallel multi-processing 3D numerical model, which has been tested by comparing to previous 2D models and publications, to study the latitudinal dependence of these fields, particularly the effect of the background geomagnetic field orientation on their formation.

Previous numerical studies in a 2D azimuthally symmetric cylindrical coordinate system [Pasko et al. 1995-1997] were unable to analyze the latitudinal dependence of these fields since the choice of a non-vertical magnetic field introduces anisotropy in the azimuthal direction. The choice of a horizontal magnetic field, however, is particularly important due to the fact that the majority of thunderstorms happen in the vicinity of the equatorial region. The QE field anisotropy may influence the probabilities of lightning occurrence [Zoghzoghy et al., 2013], and therefore manifest itself in experimental lightning data.