MODELING OF THUNDERCLOUD SCREENING CHARGES: IMPLICATIONS FOR BLUE AND GIGANTIC JETS

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A two-dimensional axisymmetric model of Maxwellian relaxation of the atmosphere is used in conjunction with the lightning simulation model of *Riousset et al.* [JGR, *112* (D15203), 2007] to demonstrate how realistic cloud electrodynamics lead to the development of blue and gigantic jets. The model accounts for time dependent conduction currents and screening charges formed under the influence of the thundercloud charge sources. Particular attention is given to numerical modeling of the screening charges near the cloud boundaries. The modeling results demonstrate the important role of the screening charges in local enhancement of the electric field and/or reduction of net charge in the upper levels of the thundercloud. The results presented in this work confirm that the accumulation of screening charges near the thundercloud top produces the charge configuration leading to the initiation of blue jets, while the effective mixing of these charges with the upper thundercloud charge causes the formation of gigantic jets, as first suggested by *Krehbiel et al.* [*Nature Geoscience*, *1* (4), pp. 233–237, 2008].

lightning, thundercloud, jets

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