

Modelling Electric Fields above Thunderstorms Produced by Tropospheric and High-Altitude Lightning Discharges

A. Odzimek¹, M. J. Rycroft^{2,3} and O. van der Velde⁴

¹ Department of Physics and Astronomy, University of Leicester, U.K.

² CAESAR Consultancy, 35 Millington Road, Cambridge CB3 9HW, U.K.

³ Centre for Space, Atmospheric and Oceanic Science, University of Bath, U.K.

⁴ Universitat Politècnica de Catalunya, Terrassa, Spain

An electric model of a thunderstorm producing electric discharges is constructed and the electric potential and electric field above the thunderstorm are simulated using the software package PSpice A/D. The structure and magnitude of the electric field produced by the discharges are studied and the conditions favourable for the initiation and development of high-altitude discharges are considered. Next an electrical circuit model which describes the development of the high-altitude discharges is presented. Furthermore the variation of the ionospheric potential and the variation of the height profile of the electric field above the thundercloud due to the discharges are calculated.