



Simulations of ELVES based on different return stroke models

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ELVES are transient luminous events occurring in the lower ionosphere at a height of about 90 km. They are triggered by energetic lightning discharges. We investigate various conditions leading to this phenomenon with emphasis on the return stroke processes. We use different engineering models, namely a transmission line model without attenuation of the current and modified transmission line models with a linear or exponential decay of the current with height, in order to investigate the shape and intensity of resulting ELVES. We show that the exponential attenuation of the current with height can decrease optical intensity of the modelled ELVES. Consequently, an energetic lightning flash with a peak current larger than 100 kA might not lead to an observable optical emission.