



New insights into the upward positive leader initiated from high tower

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Several upward lightning flashes from a 325-m meteorological tower were documented by using high-speed video camera and Beijing Lightning Network (BLNET). BLNET consists of 16 stations and locates EM pulses radiated from both CG and IC lighting with high detection efficiency [Wang et al., 2016a; Srivastava et al., 2017]. The tower-initiated lightning is used for evaluating on the BLNET capability and study on upward lightning discharges from high structures [Jiang et al., 2014; Yuan et al., 2017]. Comparison with radar echo of the corresponding thunderstorm indicates that the other-triggered upward lightning tended to occur at the dissipation stage of the thunderstorm with relatively low cloud top height and weak radar echo, while the self-initiating upward lightning was more likely to occur when the thunderstorm was in the mature stage and the tower was underneath the stratiform clouds behind the convective region. One of the upward positive leaders from the tower exhibited obvious stepwise development during its self-sustained propagation toward the cloud base, providing the first optical evidence for the stepping processes of a positive leader [Wang et al., 2016b]. Obvious brush-like corona zone emitting outwards from the leader top was identified in the frame of stepping. The need of sufficient positive charge accumulation at the leader top could be the main cause for the stepping characteristics.

References

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