



The enhancement of neutral metal Na layer above thunderstorms

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Na (sodium) exists as layers of atoms in the mesosphere/lower thermosphere (MLT) at altitudes between 80 and 105 km. It has lower ionization potential of 5.139 eV than atmospheric species, such as O₂ (12.06 eV). Tropospheric thunderstorms affect the lower ionosphere and the ionospheric sporadic E (Es) at ~100 km can also be influenced by lightning. The mechanism is expected to be associated with transient luminous events (TLE) as red sprites and gigantic jets at upper atmosphere. However, measurements of ionospheric electric fields of ~20mV·m⁻¹ above thunderstorms are less than estimated value (>48 0mV·m⁻¹) to excite ionization in the lower ionosphere. We found an enhancement of Na layer above thunderstorms. The increase of Na density in the statistical result can be as much as ~500 cm⁻³ and it will have an impact on ionospheric chemistry and modify the conductivity properties of the MLT region. The ionospheric observations made with two digisondes near the Na lidar, the thunderstorm model, ionosphere model, and Na chemistry model are all used to discuss the possible mechanisms responsible for the enhancement of Na layer after thunderstorms.