

Coupling process of large-scale atmospheric disturbances to the ionosphere through typhoon

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In recent years, tropical cyclones (TCs) have caused serious damage in the world. However, few studies have comprehensively taken into account the TC effects on the ionosphere in addition to meteorological conditions and lightning discharge characteristics of thunderstorms from TCs in the atmosphere. In this study, we investigated the coupling process of meteorological disturbances to the ionosphere from simultaneous observations of thunderstorms and ionosphere during the entire period of Typhoon 15 and Typhoon 19 in 2019. The spatial and temporal characteristics of lightning activity, meteorological characteristics (visible and infrared observations by the geostationary satellite), and lower ionospheric response (VLF/LF transmitter electric amplitude) associated with these typhoons were analyzed in detail. Distinctive features were found between parameters such as the frequency of lightning strikes, discharge polarity, development of thunderclouds, and ionospheric disturbances in different typhoon stages.

Keywords: Typhoon, Ionosphere, Atmospheric electricity, Extreme weather, Thunderstorm, meteorological disturbances