

Plasma and Neutral Coupling: Wave-4 Structure in the Ionosphere

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In the upper atmosphere, ionospheric plasma coexists with background dense neutral atmosphere. The abundance ratio of plasma/neutral is about 10^{-7} (at 100km)- 10^{-3} (at 300km), thus ionospheric plasma is significantly influenced by the background neutral atmosphere, through photochemical reactions, collisions, and electrodynamic interactions.

Recently, satellite remote-sensing with far ultraviolet optical instrument have found a global longitudinal wave-4 structure in the ionosphere. On the other hand, in the lower atmosphere, it is known that there are roughly 4 regions of active tropical convection, which is associated with land /sea distribution on the ground. Therefore, the discovery of ionospheric wave-4 structure suggests that meteorological activities around 10 km altitude can affect ionosphere at as high as 300 km altitude.

Recently, we have developed a whole atmosphere-ionosphere vertically-integrated model, by coupling three independent regional models; a whole atmospheric model, an ionosphere model, and an ionospheric electrodynamics model. In this presentation, we show simulation results of ionospheric wave-4 structure, and discuss the atmosphere-ionosphere coupling processes.

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