

Study of the physical meanings of ionospheric tidal signatures using theoretical models

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Variations the ionospheric electron density structures related to the tidal forcing propagating upward from the lower atmosphere have been studied intensively recently. The longitudinal variations of ionospheric electron density are related to the thermospheric nonmigrating tidal signatures produced in-situ or propagating upward from below. During a stratospheric sudden warming, thermospheric migrating tidal signatures are modified and lead to the phase shift of ionospheric electron density structures at low latitudes. With the increasing number of global ionospheric observations, it is desirable to relate the thermospheric tidal signatures to corresponding tidal signatures of ionospheric electron density, since the neutral thermospheric temperature and wind observations are rather limited. In this paper we perform theoretical simulations to study the interconnections between tidal modes in thermospheric neutral parameters and ionospheric plasma. The migrating and nonmigrating tides of thermospheric winds output from NCAR GSWM/TIEGCM runs are incorporated to NRL SAMI-3 to investigate the responses of corresponding tidal modes in ionospheric electron density and their physical meanings.

Keywords: atmospheric tides, tidal signature of ionospheric electron density