

Study of the Atmosphere-Ionosphere Coupling Using Observations of FORMOSAT-3/COSMIC

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Recent studies have shown that the ionospheric plasma structure is modulated by modification of the ionospheric dynamo due to upward propagating atmospheric tides of troposphere origins as well as planetary waves generated during the stratospheric sudden warming (SSW) period. These effects of lower atmospheric origins modify the ionospheric electrodynamic and result in longitudinal, latitudinal, and altitudinal variations of the low-latitude equatorial ionization anomaly (EIA). In this study, three-dimensional electron density observations derived from GPS radio occultation sounding of FORMOSAT-3/COSMIC during 2007-2010 are utilized to study the annual and monthly variations of the ionospheric tidal signatures for comparison with existing tidal modes derived from neutral atmospheric parameters observed in the mesosphere lower thermosphere (MLT) region. Meanwhile, this study also investigates the SSW effects to low-latitude ionosphere based on the constructed three-dimensional electron density maps. According to the stratospheric temperature observation of FORMOSAT-3/COSMIC, the SSW occurs every year during 2007-2010 but the occurring months and durations are different. The ionosphere response to the SSW effect is expected to vary due to these year-to-year differences in the stratosphere.

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