Influence of tides on the ionospheric annual anomalies

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Through respectively adding June tides and December tides at the low boundary of GCITEM-IGGCAS model (Global Coupled Ionosphere-Thermosphere-Electrodynamics Model, Institute of Geology and Geophysics, Chinese Academy of Sciences), we simulate the influence of tides on the annual anomalies of the ionospheric electron density. The tides’ influence on the annual anomalies of the ionospheric electron density varies with latitude, altitude and solar activity level. Compared with the density driven by December tides, the June tides mainly increases the lower ionospheric electron density, and mainly decreases the electron density at higher ionosphere. In the low-latitude ionosphere, tide drives an additional equatorial ionization anomaly structure (EIA) at higher ionosphere in the relative difference of electron density, which suggests that tide affect the equatorial vertical $\mathbf{E} \times \mathbf{B}$ plasma drifts. Although the lower ionospheric annual anomalies driven by tides mainly increases with the increase of solar activity, the annual anomalies at higher ionosphere mainly decreases with solar activity.