



Tidal signatures of the thermospheric mass density and zonal wind at midlatitude: CHAMP and GRACE observations

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By using the accelerometer measurements from CHAMP and GRACE satellites the tidal signatures of the thermospheric mass density and zonal wind at mid-latitudes have been analyzed in this study. The results show that the mass density and zonal wind at southern midlatitudes are dominated by a longitudinal wave-1 patterns. The most prominent tidal components in mass density and zonal wind are the diurnal tides D0 and DW2, as well as the semidiurnal tides SW1 and SW3. This is consistent with the tidal signatures in the F-region electron density at midlatitudes as reported by Xiong and Lühr (2014). These same tidal components are observed both in the thermospheric and ionospheric quantities supporting a mechanism that the nonmigrating tides in the upper atmosphere are excited in situ by ion-neutral interactions at mid-latitudes, consistent with the modeling results of Jones et al. (2013). We regard the thermospheric dynamics as the main driver for the electron density tidal structures. An example is the inphase variation of D0 between electron density and mass density in both hemispheres. Further research including coupled atmospheric models is probably needed for explaining the similarities and difference between thermospheric and ionospheric tidal signals at midlatitudes.