

OBSERVATIONS OF NONMIGRATING DIURNAL TIDES IN THE THERMOSPHERE

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Vertically propagating diurnal tides are a leading agent of coupling between the troposphere and the thermosphere. Due to their exponential increase in amplitude with height, tides often dominate the spectrum of lower thermospheric variability, and can influence the variability of atmospheric composition and ionization. Nonmigrating tides are known to play a key role in these processes. However, direct measurements of neutral atmospheric variables above the highest levels of TIMED sampling (105 km for winds and 120 km for temperature) appear to be confined to winds at 400 km.

We present direct observations of nonmigrating tides in the 90--270 km range inferred from the UARS wind imaging interferometer (WINDII). Analyses of daytime winds at low latitudes show a prominent zonal wavenumber 4 wave extending to 180 km, that we convincingly interpret as an eastward-propagating diurnal wavenumber 3 (DE3) viewed from the satellite perspective. This finding supports the idea that DE3 is a leading source of F-region anomalies reported in electron density. We also identify a large wavenumber one pattern in the daytime horizontal wind, that may indicate nonlinear tide-planetary wave interactions.

Thermospheric tides

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