

Interannual Variation of Diurnal Tide Components in Tropical Lower Thermospheric Temperatures

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This work takes advantage of almost 16 years of temperature observations by the SABER instrument onboard the TIMED satellite to analyze the interannual variation of the migrating diurnal tide and two non-migrating diurnal tidal components in tropical lower thermospheric temperatures. The two non-migrating diurnal tides are the DE2 and DE3 tides. These are analyzed because they are known to significantly affect the upper atmosphere. A wavelet analysis on the de-seasonalized time-series of the amplitudes of these tides between latitudes 20S and 20N and located at around 105 km show that they have very clear 2 to 4 year oscillations that are consistent with the the Quasi-biennial Oscillation (QBO) as well as the El Nino Southern Oscillation (ENSO). An 11-year oscillation is also found although this oscillation is beyond the cone-of-influence in the spectra. A closer look at the spectra though reveals that the presence of these 2 year oscillations aren't consistent throughout the data coverage. Specifically, the 2 year oscillations in DW1 disappears after 2012 while the 2 year oscillations in DE3 weakens between 2012 and 2014. Thus, this work pushes further our understanding of tidal interannual variability by explaining these specific details in the wavelet spectra of these tides through numerical experiments conducted using the Ground-to-topside model of the Atmosphere and Ionosphere for Aeronomy (GAIA). GAIA will be run with and without the QBO, ENSO and 11-year solar cycle to determine how much of these interannual phenomena contribute to these diurnal tide interannual variations.

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