

Zonally uniform tidal oscillations in the tropical stratosphere

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By analyzing data from satellite measurements, a reanalysis, and a chemistry–climate model, we discovered clear zonally uniform tidal signals in the tropical stratosphere, particularly during the Northern Hemisphere summer. Antisymmetric components with respect to the equator are dominant and are characterized by a vertical wavelength of ~ 15 km and a diurnal frequency. The temperature and vertical-wind amplitudes in the stratosphere are 0.2–0.8 K and 1–5 mm s^{−1}, respectively. The latter is generally larger than the climatological ascent motion in the stratosphere. The observed latitudinal and vertical structures can be explained by the second, propagating, antisymmetric Hough mode. These tidal oscillations should be carefully considered in analyses of zonal-mean fields at a particular universal time.

Key words: diurnal variations, nonmigrating tides, wavenumber 0, Brewer-Dobson Circulation