

Wavenumber-4 longitudinal structure in ICON-MIGHTI thermospheric meridional wind

The wavenumber-4 (wave-4) structure in the longitude variation of zonal and meridional winds observed by the Michelson Interferometer for Global High-resolution Thermospheric Imaging (MIGHTI) instrument onboard the Ionospheric Connection Explorer (ICON) satellite is investigated. The amplitude of the wave-4 pattern in meridional wind displays semi-annual variation with equinoctial maxima. In contrast, its seasonal variation in zonal wind shows maxima during August-October over the equatorial and low latitudes. The wave-4 longitude variation maximises at lower thermospheric heights (below 130 km) in zonal and meridional winds. It is considered primarily driven by the non-migrating eastward propagating diurnal tide with zonal wavenumber-3 (DE3) in the zonal wind. However, the amplitude of DE3 tide in the meridional wind does not show any enhancement during September-October. The seasonal variations of the wave-4 amplitude and the DE3 tide are not similar in the zonal and meridional winds. The migrating ter-diurnal tide (TW3) exhibits significant amplitudes during March-April and September-November in the meridional wind. In addition, the latitude variation of non-migrating TE1 tide shows maximum amplitude during September-October. These results suggest that the non-linear interaction between the TW3 and TE1 tides can serve as a potential source for the wave-4 longitude variation in the meridional wind at lower thermospheric altitudes.

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Session Classification: Stratosphere / mesosphere / thermosphere response and coupling of atmospheric layers

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