

Influence of MJO on the Turbulence Kinetic Energy in the Tropical Tropopause Layer observed from Equatorial Atmosphere Radar data

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We investigate the turbulence kinetic energy (TKE) near the tropical tropopause using long-term dataset of Equatorial Atmosphere Radar (EAR) version 02.0212 from July 2001 to June 2018. TKE is estimated from the observed spectral width data in the northward beam to reduce the effect of strong zonal wind shear. We analyze the variation of TKE and the mean zonal wind (U) at 17 km, which is considered as the mean height of the tropical tropopause, as well as the phase propagation of Madden Julian Oscillation (MJO) from the Real-time Multivariate MJO index (RMM). We discuss the relationship between TKE and U in the active and inactive period of MJO (MJOa and MJOi), on the basis of the amplitude RMM, at Phase 3 and Phase 4 (P3 and P4) when MJO propagates from Indian Ocean to Maritime Continent. The results show that both during MJOa and MJOi, TKE is found larger up to $1.0\text{-}1.5\text{ (m/s)}^2$ associated with strong westward wind than with eastward wind (about 0.5 (m/s)^2). The magnitude interval of westward wind in MJOa is larger than in MJOi, particularly at P4. The variation of TKE and U in seasonal MJOa at P4 indicates contrast between northern hemisphere winter and summer. Our analysis describes large turbulence occurred associated with strong westward wind especially during the active period of MJO.