Modulation of Tropical Tropopause by Equatorial Waves in different season and different phases of QBO using ground based and space-borne observations

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In the present paper an attempt has been made to study modulation of tropical tropopause by equatorial waves using high resolution observations obtained from COSMIC GPS radio occultation (RO) and Radiosonde data during August 2006-August 2008. The radiosonde stations (Gadanki, Truk, Rochambeau, Singapore, Seychelles, and Darwin) distributed across the globe within $\pm 13^{o}$ from equator where data are available with good vertical resolution. The main focus in this paper is to quantify the behavior of the Kelvin wave/ Rossby gravity wave in different season and different phases of Quasi-Biennial Oscillation (QBO), which play dominant role in the modulation of the tropical tropopause. All stations including Gadanki shows strong annual cycle observed in temperature near tropical tropopause over Gadanki (13.45^{o}E, 79.18^{o}N) similar as observed in the equatorial belt (10^{o}S-10^{o}N), however, zonal wind over Gadanki shows weak influence of the QBO unlike Singapore. Zonal wind at Gadanki in UTLS (~10-20 km) region show strong association with tropical easterly jet streams. The tropopause over Gadanki is higher than the mean tropopause in the equatorial belt. It is found that the tropopause show the component of zonal wave number up to 4. The dominant periodicity in the zonal wave number 1 lies in the range of 18-23 days and 10-12 days in the height region of 15-20 km. However, the dominant periodicity for zonal wave number 2-4 is found in wide band of 5-20 days in the height region of 15-20 km. The tropical tropopause is found to be modulated with periodicity 8-12 days and 18-23 days, in general. The temperature shows eastward phase propagation with constant phase tilt in height- longitude diagram. A new phase a characteristic of the equatorial wave is observed. It is noticed that the cold point tropopause temperature and height are not exactly in opposite phase. The details of the study will be presented in the conference.