

Impact of QBO and ENSO on the stratospheric water vapor from the equator to mid-latitudes

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The combined effect of QBO and ENSO on the stratospheric water vapor via perturbation in equatorial cold point tropopause (CPT) is being investigated using measurements by MLS satellite data over a period of 2005-2017. Inter-annual variation in tropopause temperature is found to be clearly influenced by QBO wherein the westerly (easterly) phase creates warm (cool) anomalies in the CPT. These warm and cool features in CPT modifies the exchange of water vapor entering in the stratospheric region. It is concluded that QBO induces the changes in CPT and water vapor by as much as 2-4°C and ~1ppmv, respectively. The impact of QBO is not confined only to the stratospheric water vapor of equatorial region (4°N-4°S) as shown in many previous studies rather it affects the tropical and mild-latitudes too. It is noted that QBO induced anomalies in CPT and stratospheric water vapor are also found to be influenced by ENSO from the bottom side. Warm and cool anomalies as a consequence of different phases of QBO prevail in a localized manner that eventually can influence convection process and trace constituents of UTLS region. It is concluded that QBO and ENSO induces changes in the temperature as well as in the water vapor at tropopause region which further plays a significant important role for the stratospheric dynamics from the equator to mid-latitudes regions.

Key words: QBO, ENSO, tropopause dynamics, stratospheric water vapor