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Impact of different phases of QBO over temperature in the tropopause region: Focus on the tropical dynamics

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The effect of QBO on temperature of cold point tropopause (T-CPT) and its height (H-CPT) is being investigated using radio occultation measurements by COSMIC/FORMASAT-3 over a period of 2007-2013. In general, T-CPT is found to be the coldest in February and warmest in August. H-CPT also shows a maximum between December and February and minimum during July -August in both the hemispheres. Interestingly, however, the H-CPT shows off-equatorial maxima (around and beyond 20°N or 20°S) during all the seasons. The H-CPT at off-equatorial region remains higher during Northern Hemisphere (NH) winter as compared to monsoon season. Inter-seasonal variation in T-CPT and H-CPT is found to be clearly influenced by QBO wherein the westerly (easterly) phase favors warm (cool) T-CPT with a decrease (increase) in H-CPT. It is concluded that QBO induces the changes in T-CPT by as much as 2°C and in H-CPT by 0.5 km. Unique features of the influence of QBO phases over different longitude sectors are also discussed. Warm and cool anomalies as a consequence of different phases of QBO prevail in a localized manner that eventually can influence the water vapor budget especially over Indian-Indonesian sectors. COSMIC mission has clarified such findings and enabled us to look beyond from the climatic change point of view towards deep understanding of the atmospheric dynamics itself.