Meso-scale Convection System and Occurrence of Extreme Low Tropopause Temperatures: Observations over Asian Summer Monsoon Region

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The present study examines the process as to how tropospheric air enters the stratosphere, particularly in association with tropical mesoscale convective systems (TMCS) which are considered to be one of the causative mechanisms for the appearance of extremely low tropopause temperature over the tropics. The association between the phenomena of convection and the observation of extreme low tropopause temperature events is, therefore, examined over the Asian monsoon region using data from multiple platforms. Satellite observations show that the area of low outgoing long wave radiation (OLR), which is a proxy for the enhanced convection, is embedded with high altitude clouds top temperatures (≤ 193 K). A detailed analysis of OLR and 100 hPa temperature shows that both are modulated by westward propagating Rossby waves with a period of ~ 15 days, indicating a close The process by which the tropospheric air enters the linkage between them. stratosphere may, in turn, be determined by how the areas of convection and low tropopause temperature (LTT) i.e. $T \le 191K$ are spatially located. In this context, the relative spatial distribution of low OLR and LTT areas is examined. Though, the locations of low OLR and LTT are noticed in the same broad area, the two do not always overlap, except for partial overlap in some cases. When there are multiple low OLR areas, the LTT area generally appears in between the low OLR areas. Implications of these observations are also discussed. The present analysis also shows that the horizontal mean winds have a role in the spatial distribution of low OLR and LTT.