

Revisiting water vapor seasonal cycle observed in tropical lower stratosphere: Role of BDC, convective activity and ozone

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In the present study, we are revisiting the issues related to the hydration of the tropical lower stratosphere (TLS) particularly over the Asian monsoon region (AMR) and dehydration occurring over the Indonesian-Australian western Pacific region (IAWPR). Low tropopause temperatures ($T_{100} \leq 191$ K) and convective activity are observed over both the regions, but hydration in the TLS is observed over AMR during NH summer monsoon and dehydration over IAWPR during NH winter (SH summer monsoon). In this study, an attempt has been made to understand these anomalies over the two tropical regions. It is observed that during NH summer monsoon, BDC is relatively weak and areas of low T_{100} occur in patches over AMR. The area of convection is observed to partially overlap the region of low T_{100} and noted to play a significant role in hydration of TLS over AMR. In contrast, during NH winter (SH summer monsoon), BDC is relatively stronger and the areas of low T_{100} are wide spread, especially over the southern tropics. In such condition, freeze drying process is likely to occur over a relatively large spatial area of IAWPR, triggering the dehydration of TLS. In addition, deep penetrating convection appears to be relatively less frequent over this region.