

Thunderstorm induced stratosphere-troposphere exchange during pre-monsoon over Kochi

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The processes in Stratosphere and Troposphere are strongly correlated with each other and exchange of water vapor, momentum and energy between these two layers have much significance on climate. Recent studies indicate that stratospheric water vapor and its variability play an important role in changing climate. High-resolution data, even though available only at few locations, are highly useful for the analysis of stratosphere troposphere exchange. A stratosphere-troposphere (ST) radar (205 MHz) is operational at the Advanced Centre for Atmospheric Radar Research (10.04N; 76.33E), Cochin University of Science and Technology, India. This radar provides accurate measurements of upper troposphere-lower stratosphere (UTLS) region. Observations made during May 16 – 19, 2017, few days prior to the onset of Indian summer monsoon show that strong convection reached the tropopause height and disturbed the tropopause.

It is observed that during this event radar return power was very strong throughout the troposphere up to tropopause which indicates water vapor presence in the upper troposphere and close to the tropopause. Water content in the lower stratospheric region and its entry into that region is a much-debated topic in climate studies. For the analysis of exchange of water content Modern Era Retrospective Analysis for Research and Applications (MERRA-2) reanalysis data and Aura MLS satellite data has been used. CALIPSO satellite data also used for analysis of deep convective activity. An analysis of the mixing air between stratosphere and troposphere after deep convective activity is done.