

Tropical upper tropospheric humidity variations and tropical plumes due to potential vorticity intrusions over Indian sector

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The ERA-interim relative humidity (RH) shows consistent increase by more than 50% in the upper troposphere (200–250 hPa) over tropics at the eastward side of the potential vorticity (PV) intrusion region. The increase in RH is confirmed with the spaceborne microwave limb sounder observations and radiosonde observations over Gadanki (13.5° N, 79.2° E) and is observed irrespective of whether the PV intrusions are accompanied by deep convection or not. It is demonstrated that the increase in RH is due to poleward advection induced by the PV intrusions in their eastward side at the upper tropospheric heights. It is suggested that the low-latitude convection, which is not necessarily triggered by the PV intrusion, might have transported water vapour to the upper tropospheric heights. Apart from this the Meteosat IR imagery also confirms the occurrence of large spatially extended cloud bands known as tropical plumes over Indian sector associated with PV intrusion events, whenever the poleward advection is strong. The TPs play major role in the transport of moisture from lower latitudes to higher latitudes. The ERA-interim specific humidity averaged for 200-300 hPa shows large scale moisture transport from lower to higher latitudes tracking the plume structure. It is suggested that the occurrence of TP may be due to the poleward advection associated with the PV intrusion.

Key words: Potential vorticity intrusion, upper tropospheric relative humidity, tropical plumes.