Tropopause structure and variability observed using long-term Indian MST radar observations

S. Ravindrababu[1], M. Venkat Ratnam[2*], Ghouse Basha[2], S. V. Sunilkumar[3], K. Parameswaran[3], and B. V. Krishna Murthy[4]

[1]Jawaharlal Nehru Technological University, Hyderabad, India.
[2]National Atmospheric Research Laboratory (NARL), Gadanki, India.
[3]Space Physical Research Laboratory (SPL), Trivandrum, India.
[4]CEBROSS, Chennai, India.
*vratnam@narl.gov.in , baburavindra595@gmail.com

The structure and variability of the tropical tropopause over Gadanki (13.5^{o}N, 79.2^{o}E) are delineated using data obtained from Indian MST radar operated in the vertical mode as a part of intense Tropical Tropopause Dynamics (TTD) campaigns conducted under the CAWSES India Phase II (Theme 3) programme. Radar measurements for 72 h in each month from December 2010 to March 2014 have been considered. The identified tropopause altitude with radar (RTH) is compared with the cold point (CPH) and lapse rate tropopause altitudes (LRH) obtained from simultaneous radiosonde data at three hourly intervals during these campaigns. Most of the time, a very good agreement between the RTH and CPH and/or LRH from radiosonde measurements is observed. The mean difference between RTH and CPH and RTH and LRH is found to be 0.1± 1 km and 0.5±1 km, respectively. The smaller difference between RTH and CPH noticed in the present work when compared to other mid- and polar latitudes is due to the well-defined tropopause structure in the tropical latitudes. On long-term basis (2007–2014) also these differences are observed to be −0.1±0.4 km and 0.3±0.4 km, respectively. This suggests that both on short-term and long-term basis differences between the tropopauses derived from the two methods agree well with each other. As the radar provides reliable data on the tropopause, its long-term variability is investigated using the data from 2007 to 2015 available from the MST radar. An increase of 200 m in the tropopause altitude is observed over Gadanki in the last decade.