

The Predominant Occurrence Altitudes of Middle Atmospheric Temperature Inversions and Mesopause Over the low Latitude Indian Sector

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Mesospheric temperature inversions are an important indicator to identify the dynamical and chemical heating of the middle atmosphere by the wave breaking (i.e., gravity and planetary waves) and solar heating. Mesopause is the coldest region in the earth's atmosphere, it is understood that mesopause having double peak altitude in the mid and high latitude region however there no such a variation over the low latitudes. Variation of the mesopause temperature also highly depends on wave breaking and solar heating and CO₂ cooling effect. Thus, the detailed study of the mesospheric inversion layer (MIL) and mesopause occurrence altitude with long term basis will give the information about the role of atmospheric dynamics for climate variability and change. Keeping this in mind, using the Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) data we attempt to study the occurrence characteristics of the multiple MILs in the 60–105 km altitude region and mesopause during solar maximum and solar minimum over the low latitude Indian sector.

It is noted that lower inversions in the mesospheric temperatures occur in the 70–75 km altitude regions while the upper inversions occur in 90–95 km altitude regions. The mesopause altitude is mostly noted to be ~98 km with the night-time mesopause (particularly in the year 2002) showing a small peak in the mesopause occurrence at ~75 km altitude. The higher occurrence rate of MILs during high solar activity year compared to low solar activity year. It is also observed that night time MILs show a systematic seasonal variability, with higher occurrence of single and double temperature inversions during equinoxes.

Key words: SABER, mesospheric inversion, mesopause, solar variability