Lidar Observations of Middle Atmospheric Thermal Structure over Gadanki

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A Rayleigh backscattering lidar has been in regular operation at the National Atmospheric Research Laboratory, Gadanki, a rural site in the Tropical part of India, since 1998. Using this system, profiles of middle atmospheric temperatures were obtained in the height range covering 30 to 80 km. The derived height profiles of temperatures manifest presence of significant cooling at upper stratospheric heights and strong gravity wave activity at mesospheric heights. It is reported that these are the unusual features in temperature profiles that represent sudden stratospheric warming (SSW) occurrences at polar latitudes. The lidar observation of sturdy wave activity at mesospheric heights strongly correlates with the frequent occurrence of temperature inversion at these heights. Upward propagating gravity waves undergo dissipation at these heights and cause stratified layers of temperature inversions.

Keywords: back scatter lidar; tropical atmosphere; stratospheric cooling.