

Atmospheric boundary layer features over a tropical inland station during different seasons using UHF wind profiler

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A better insight of the structure and dynamics of Atmospheric Boundary Layer (ABL) is essential for understanding and modelling of the chemistry and dynamics of the atmosphere at all scales. Recent advances in radio probing techniques such as wind profilers made possible to sample large volume of ABL with good spatial and temporal resolution. They offer a unique opportunity to study the boundary layer structure, wind and turbulence field. The ABL observation over tropical Indian regions is comparatively sparse. The present study is based on the wind profiler established at NARL (National Atmospheric Research Laboratory), Gadanki (13.5 N, 79.2⁰ E) India. Using the wind profiler data collected during the period from March 99 to Sept 2000, the ABL evolution during different seasons, wind structure, mixed layer depth, rate of dissipation of turbulent kinetic energy and its seasonal variations are studied. The study shows that the ABL depth over Gadanki varied from 1.5 km to 3 km. ABL depth is low Dec - Jan months and high during April – May. During SW monsoon period low level jet is observed at 1.5 km. The jet speed reaches a maximum value during July. Rate of dissipation of turbulent kinetic energy (TKE) is estimated from RADAR spectral width after applying corrections for spectral width due wind shear and antenna beam width. Rate of dissipation of TKE varies from 10^{-4} to 10^{-2} m^2s^{-3} within the boundary layer. Rate of dissipation is found to be higher during pre monsoon and monsoon months compared to that during other seasons.