Characteristics of Atmospheric Waves in the Upper Troposphere Observed with the Gadanki MST Radar – RASS

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Indian MST Radar at Gadanki (13.46°N, 79.17°E) working at 53MHz was operated continuously in Radio Acoustic Sounding System (RASS) mode with six distributed acoustic exciters during 22-25 August 2007 for about 69 hours. This system was operated in RASS and turbulence echo modes alternately, with one cycle spanning about 20 minutes. Temperature and wind velocity were observed in the altitude range of 3.6 - 12km most of the time and 3.6 - 20 km respectively with a range resolution of 150 m. Presence of inertia-gravity wave activity in the lower stratosphere was identified. Perturbations in the wind and temperature fields in the troposphere, however, indicated a mixture of waves with a wide frequency range, within which a dominant periodicity of \sim 8 hours was revealed by spectral analysis. Further, signatures of diurnal tide were also observed and the observed phase profile was found to exhibit a close match with the Global Scale Wave Model (GSWM). From the RASS virtual temperature profiles, timeheight section of Brunt-Vaisala frequency squared was computed to deduce the background atmospheric stability, which showed stable layered structures with slow downward phase progression. Outgoing Longwave Radiation (OLR) over Gadanki and TRMM precipitation data over peninsular India was used as an indicator of convective activity. During the beginning of the observation period, eventhough lower OLR was seen, corresponding convective activity or precipitation was not seen in the TRMM data. On the third day, enhanced temperature perturbations could be related to widespread precipitation shown by TRMM.