Geophysical Research Abstracts, Vol. 9, 02131, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02131

A comparison of latitudinal mesospheric turbulence scattering of radar waves

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Mesospheric turbulence generated due to neutral or plasma dynamical processes affect the VHF radio wave propagation as revealed from the MST radar backscatter observations. The occurrence and inhomogeneous characteristics of the mesospheric turbulence need to be better understood and latitudinal variations delineated. The results would have wide implications in assessing the impact of trans-ionospheric VHF radio propagation. While considerable results are available on the morphology of the mesospheric turbulence scattering over the high latitude regions, the data over the low latitudes have been insufficient till recently. The MST radar facility set up at the Indian station Gadanki (13.5° N) has bridged this gap to some extent. Using the observations at 53 MHz over Gadanki and similar results obtained over other stations the seasonal and solar cycle variability of the mesospheric turbulence and radio wave scattering are brought out and compared between different latitude regions. The latitudinal differences in the processes governing the turbulence mechanisms are explained and model results brought out as an attempt towards possible forecast of strong turbulence events which could deteriorate the quality of trans-ionospheric radio propagation and hence would need to be taken up as complementary design inputs.