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MST radar observations of gravity wave associated with convection in the troposphere and lower stratosphere

KISHORE PANGALURU[1], S. P. NAMBOOTHIRI[1], IGARASHI KIYOSHI[1] and D. NARAYANA RAO[2]

[1]*NICT, International Alliance Division*
[2]*NMRF, National MST Radar Facility*

Measurements with the MST radar have revealed a striking illustration of gravity wave generation in the troposphere and lower stratosphere. In this paper, we attempt to describe gravity waves generated most likely by convection in the troposphere and lower stratosphere. The data collected by the Indian MST radar observations at Gadanki (13.5 N, 79.2 E) on 16 June 1996 are used in this case study. During the convection period (18:20 LT to 19:05 LT), strong vertical wind between 7 and 12 km coupled with quick growth in the turbulence is identified. The magnitude of the vertical wind and Doppler width is unusually very high with a factor of about five. Below 7 km downdraft is dominating with large magnitude. During the convection period the wind disturbances are found to have comparatively large magnitude of momentum flux at mid-tropospheric levels. It is clear that momentum flux in the zonal component is biased towards the negative side and the fluxes corresponding to the meridional wind is towards the positive side. This indicates that most of the gravity waves which contribute to the momentum flux have wavenumber vectors directed westward during the period of observation. Hodograph analysis indicated that hodographs are elliptical in shape and rotates clockwise with increasing height and the wave appears to have a vertical wavelength of 2.5-3.0 km.