Characteristics of Gravity Wave Activity over a Tropical Station, Gadanki

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Exact source mechanisms for the generation of gravity waves of different scales are investigated over a low latitude station like Gadanki (13.5oN, 79.2oE), with a special emphasis during monsoon season. MST Radar, operated in a continuous mode is used to characterize the short and medium scale gravity waves, whereas, collocated high resolution GPS radiosonde measurements for inertia gravity waves. Different wave parameters are estimated using the hodograph analysis. It is well known that convection, wind shear (vertical shear of horizontal wind and/or geostropic adjustment i.e., spontaneous imbalance in jets) and topography are dominant sources for the generation of gravity waves over the tropics. During southwest monsoon season (June-August), over Indian region both convection and wind shear co-exists but wind shear (both vertical shear of horizontal wind and geostropic adjustment) is found responsible for the generation of GWs on various scales. This analysis has lead an interesting question 'what happened to the waves generated due to convection?'. Clear semi-annual variation in inertia gravity wave energy with maximum during monsoon and winter and minimum during pre- and post-monsoons in the troposphere is noticed during 2006 and 2008 but not clear in 2007. Annual variation is observed in the lower stratosphere with maximum during monsoon (winter enhancement is not significant) season. This kind of winter enhancement in the troposphere is not expected at this tropical site but the contribution of meridional wind to the total kinetic energy is prominent. At the lower stratospheric height waves are propagating mainly eastward, indicates the selective filtering of westward propagating gravity waves due to strong shear. In addition, wave mean flow interactions due to the wind shear of the QBO become important in the lower stratosphere, which modifies the potential energy (EP) distribution at lower stratosphere. The magnitude of stratospheric EP is ~ 10 J/Kg over Gadanki and is more prominent in the eastward wind phase of QBO, which matches fairly well with ground based observations.