

Using the long term data set from Rocket, MF radar and VHF radar spanning three decades, few climatological changes have been observed in the mesospheric mean winds such as decrease in winter eastward wind, mesospheric QBO and SAO. Details will be presented during symposium.

Study of mesospheric turbulence using rocket-borne electron density measurements

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A rocket-borne Langmuir probe was flown from Thumba on November 27, 2005 at 1123 hrs IST to study the mesospheric plasma density irregularities produced through the neutral turbulence mechanism. The Langmuir probe detected electron density irregularities with scale sizes in the range of 1m to a few km in altitude range of 67 to 90 km during the rocket ascent. The altitude-averaged (over 100 m) power spectra from wavelet spectrograms of electron density irregularities show spectral indices ranging from -1.5 to -1.9 in the inertial sub range (ISR) and greater than -3.5 in the viscous dissipation range (VDR). The spectral index values in the ISR are very close to the characteristic Kolmogorov -5/3 slope due to neutral turbulence. The Heisenberg model was fit to spectra that showed the presence of both the ISR and VDR regimes and the inner scale was identified. The turbulence parameters were then deduced. The observed energy dissipation rates in the above altitudes range from few mW/kg to few hundreds of mW/kg.

Gravity waves sources in the Brazilian equatorial region during SpreadFEX campaign

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Gravity waves in the mesosphere were observed by airglow all-sky imaging technique at São João do Cariri (7°S, 36°W) from September to November 2005, during SpreadFEX campaign carried out in Brazil. A reverse ray tracing method was used to find out wave source region and to study propagation process through the middle atmosphere. Ray tracing results showed that the wave source regions in the troposphere are located 500 km away from the observation site mainly in NW and SW side of the observatory. Tropospheric sources were related with the cloud activity observed in the infrared images taken by METEOSAT satellite. Wind field and Omega (Pa/s) parameter was used to study a special case of a gravity wave with a horizontal wavelength of 120 km and period of 42 minutes. The results showed that the source location of this wave is located at NW site of the observatory, distant more than 700 km away. Source region found with the ray tracing technique is in good agreement with the observational data taken by the infrared images, wind field and Omega (Pa/s). The possible generation mechanism for this wave could be attributed to the dynamic instability caused mainly due to the vertical wind shear observed in the Omega data.