

Effects of Atmospheric Gravity Waves in the Mesosphere-Lower Thermosphere (MLT) Region

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Atmospheric gravity waves are generated by a variety of processes including the interaction of surface winds with topography, meteorological disturbances, deep convective storms, geostrophic adjustment of the jet stream, and so on. It is now widely accepted that the general circulation of the middle atmosphere is maintained with gravity wave drag force. In addition, upward propagating gravity waves play an important role in the coupling processes between the lower atmosphere and the mesosphere-lower thermosphere (MLT) region. We analyzed the behavior of the gravity waves by means of ground-based high resolution observations, such as radiosondes, MST, meteor, and MF radars. We also employed the profiles of temperature at 0-40 km, and electron density profiles observed with the GPS radio occultation missions. We report in this paper comparison of the time variations between tropical convection in the troposphere, the gravity wave energy in the stratosphere and MLT region, and semi-annual oscillation in the MLT region. We also discuss a correlation between the distribution of sporadic E layers and mountain waves over the South American continent.

Keywords: Atmospheric Gravity Waves, Meteor/MF radar, GPS radio occultation, Mesosphere-Lower thermosphere (MLT), Sporadic E layer, Semi-annual oscillation