

COUPLING BETWEEN TROPOSPHERE-STRATOSPHERE-MESOSPHERE-LOWER THERMOSPHERE AND IONOSPHERE THROUGH WAVES AND OSCILLATIONS; RESULTS FROM MIDAS PROGRAM

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A five year long ISRO's Middle Atmospheric Dynamics Studies-MIDAS (2002-2007) program was carried out with co-ordinated experimental observations using High altitude balloon flights, Indigenous Rohini sounding rocket flights, MF radar, Meteor Wind radar, MST radar, lidar etc. from various locations over Indian continent, to address multiple themes and scientific objectives. The high resolution temperature data from lidar at Gadanki (13.5° N) and the high resolution wind information from Meteor wind radar at TERLS (8° N) could reveal the characteristics (vertical propagation, seasonal variation, potential energy, momentum flux etc.) of gravity waves of 2-4 hrs periodicity in the 25-65 km height region and 80-98 km height region respectively. The divergence of momentum flux of these waves could be used to estimate the mean flow acceleration and this estimated values were compared with the measured values using the background wind information from the NCEP data, balloon, rocket and radar data in the tropical region. Thus quantitative estimation of forcing from gravity waves towards the generation of easterly/westerly phases of Stratospheric Quasi-Biennial Oscillation (SQBO), Stratospheric Semi-Annual oscillation (SSAO) and Mesospheric Semi-Annual oscillation (MSAO) could be made possible. In general, the forcing by gravity waves towards the generation of these long period oscillations was found to vary from 10-70 %. The characteristics of gravity waves and intra-seasonal oscillations in the stratospheric-mesospheric-lower thermospheric regions could be linked with the lower tropospheric sources making use of the simultaneous observations from surface to the lower thermospheric regions. The presence of planetary waves with different bands of periodicities could also be established through out the lower, middle, upper atmosphere and ionospheric regions. Thus coupling between different regions of atmosphere through various wave activities over the equatorial region could be established from the observational studies under MIDAS program which will have potential applications in modelling studies.

Gravity waves, Quasi-Biennial Oscillations, Semi-annual oscillations

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