

Radar, Radiosonde and Satellite-based Observations of 5-8-day wave in the Equatorial Atmosphere: Vertical Propagation and Zonal Characteristics of the Wave from Troposphere to MLT Region

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Tropical convection is suggested to be the source mechanism for many of the waves generated in the lower atmosphere. Outgoing Longwave Radiation (OLR) data have been used as a proxy for tropical convection. The space-time spectral analysis of symmetric component of OLR data for the latitudes 15N-15S and for the period March-May 2004 reveals the presence of 5-8-day wave as eastward propagating with zonal wavenumber 3. The analysis of intensive radiosonde observations carried out during CPEA campaign period and routine radiosonde observations over Indonesia also reveal the presence of a wave of similar periodicity in the upper troposphere and lower stratosphere (UTLS) region during April-May 2004. This revealed that 5-8-day wave was generated in the lower atmosphere due to tropical convection and propagated vertically and hence appeared in the UTLS winds and temperature. Interestingly, mesosphere and lower thermosphere wind data acquired by coordinated radar observation network over Indonesia shows the presence of a strong 5-8-day wave with dominant period around 7-days during April-August, 2004. The wave observed in different regions have strong zonal component. Considering similar periodicity, duration of wave event and strong zonal signature, an attempt is made to study the vertical propagation and structure of the wave from lower atmosphere to MLT region using the temperature data acquired by SABER (Sounding of Atmosphere using Broadband Emission Radiometry) instrument (an infrared multispectral radiometer) aboard the TIMED satellite, in conjunction with radiosonde and radar data mentioned earlier. A Preliminary analysis shows that the characteristics of 5-8-day wave observed in zonal wind and temperature are different during June-July 2004. At MLT heights, the former appears to be Rossby wave and the latter has the structure of Kelvin waves. However, for the case of April-May 2004, the structure of the wave is similar in both parameters. Detailed analysis is being carried out to study the horizontal structure and vertical propagation of these waves from troposphere to MLT heights and the results will be presented.