First Observation of Quasi-Two-Day Qave in the Lower Stmosphere over Hyderabad (17.2º N 78.2º E)

Gopa Dutta[1], P.V.Rao[3], Salauddin Mohammad[1], M. Satya Kumar[2], Y.K. Reddy[2], P.Vinay Kumar[5], M.C. Ajay Kumar[6] and H. A. Basha[4]

[1]Anwarul-Uloom College, Osmania University, Hyderabad, India.
[2]India Meterological Department (IMD), Hyderabad.
[3]Department of Physics, Vasavi College of Engg., Ibrahimbagh, Hyderabad, India.
[4]Maulana Azad National Urdu University, Hyderabad, India.
[5]Geetanjali Institute of Science and Technology, Aziz nagar, Hyderabad, India.
[6]Vanjari Seethaiah Memorial Engg. College, Bandlaguda, Hyderabad, India.

The quasi-2-day wave is a global oscillation frequently observed in the middle and upper atmosphere during solstices. Both theoretical and observational studies have contributed to the understanding of the characteristics and possible sources of these waves. The 2-day wave has been associated with Rossby-gravity mode of zonal wavenumber 3 and also baroclinic instability of summer easterlies. In this paper, we have investigated the characteristics of this wave in the lower atmosphere (1-34 km) of a tropical station Hyderabad (17.2º N 78.2º E). India Meteorological Department (IMD) conducts regular GPS radiosonde flights twice a day from Hyderabad. The high resolution (1sec) data of wind between 15 May and 24 September, 2009 and temperature in the altitude range of 1-34 km have been used for the present study. Two-day waves of appreciable amplitude could be observed in both zonal and meridional winds and also in temperature data. FFT analyses identified the waves in two period bands (44-52 h and 55-60) h with longer periods becoming more prominent in the months of August and September. Maximum amplitudes of ~3.5-3.7 m/s are found between 15 and 20 km with downward phase progression. The thermal amplitude maximum is ~ 2 - 2.5º K in the altitude range of 17-20 km. The amplitudes observed below 15 km are quite insignificant. Wavelet analysis shows a clear modulation of 2 day wave amplitude by a planetary wave of 7-10 day period.