

The Quasi-16-day Wave and its Latitudinal Variability in the Middle Atmosphere over Brazilian Stations

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Quasi-16-day wave (QSDW) is a conspicuous oscillatory feature on many atmospheric layers. It has been interpreted as a normal mode among several present in the atmosphere. It normally appears as wave bursts presenting large variability depending on altitude, time and latitude. In order to better understand its latitudinal variation and the coupling of the mesosphere-lower-thermosphere (MLT) and stratosphere a comparative study of this wave is made using meteor radar observations and reanalysis data from three Brazilian stations, São João do Cariri (7.4°S, 36.5°W) (CA), Cachoeira Paulista (22.7°S, 45°W) (CP) and Santa Maria (29.7°S, 53.7°W) (SM) for the year 2005. Broad spectral behavior around 16-day periodicity occurs and may indicate multiple modes of the concerned wave component. The wave amplitude shows a number of peaks over the year with the largest one in summer and winter in the case of MLT and stratosphere, respectively. A potential coupling of this wave with other short period planetary waves, especially at CA and CP is evidenced. Zonal propagation exhibits both eastward and westward waves but there is a general preference of eastward waves at mid-latitude and westward waves at tropical latitudes. The prevailing eastward background wind in the middle atmosphere is believed to favor the wave filtering of westward propagating Rossby waves at lower latitude and eastward jet existing at mid-latitude stratosphere may excite eastward waves through barotropic/baroclinic instability in winter in consistence with the past investigations from the southern hemisphere. Additionally, the summertime large wave amplitudes in the MLT are believed to be mainly caused by the waves propagating from the northern winter hemisphere through cross equatorial ducting channel.