Anomalous QBO influence in the long period Kelvin waves in the low latitude mesosphere and lower thermosphere region over Kolhapur (16.7ºN, 74.2ºE)

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Abstract

Medium Frequency (MF) radar observations of hourly mean zonal wind and meridional winds over Kolhapur (16.7ºN, 74.2ºE) over a period of August 2014-January 2017 are utilized to examine the influence of recent anomalous Quasi Biennial Oscillation (QBO) in the long period Kelvin waves in the mesosphere and lower thermosphere (MLT) region. Kelvin waves play a very important role in the dynamics of the equatorial middle atmosphere. These eastward propagating planetary scale waves carry eastward momentum turn upwards and are damped by various processes like radiative cooling, small scale turbulence and critical level interactions. The radiosonde winds at Singapore are used to identify the phase of the stratospheric QBO at 30 hPa. In 2015-16, there was anomalous upward displacement of eastward phase of QBO from 30 to 15 hPa by Newman et.al,(2016). Our preliminary results clearly reveal the response of anomalous QBO in the mean winds in the zonal wind and long period Kelvin waves of about ~16 day wave generated in the MLT region. The dominant slow phase speed waves at MLT heights motivate to us to investigate its origin and vertical propagation characteristics. In order to find out the Kelvin waves in the troposphere and stratosphere, we have utilized MERRA reanalysis dataset and employed a space- time spectral analysis shows the presence of long period Kelvin waves with wavenumber 1 during eastward phase of QBO. Results from a detailed analysis of these observations will be presented and discussed in the context of the dynamics of middle atmosphere.