PLANETARY WAVE COUPLING OF EQUATORIAL ATMOSPHERE-IONOSPHERE SYSTEM DURING FEBRUARY-APRIL 2008: RESULTS FROM A CAWSES-INDIA CAMPAIGN

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Planetary scale waves like tides, global-scale normal modes and equatorial Kelvin waves play an important role in the dynamics of the mesosphere-lower thermosphere (MLT) region. Earlier it has been hypothesized that if a global-scale wave with large amplitude and fairly long vertical wavelength propagates into the ionosphere from below, it should drive an electric current system through the dynamo action with a period of the global-scale wave. Such a wave disturbance thus causes perturbations in the geomagnetic field that could be recorded on the ground. An experimental campaign was conducted during February-April 2008 under the CAWSES-India program to understand the role of MLT variabilities contributing to the quiet-time ionospheric weather. The present work makes use of the ground magnetometer data from Tirunelveli and Alibag for computing the equatorial electrojet (EEJ) strength and the MLT wind data available from Tirunelveli and Kolhapur. Zonal and meridional winds up to stratospheric heights are obtained from UK Met Office assimilated stratospheric data (UKMO). The analysis reveals 5- and 16-day periodicities that were strong in both radar (zonal) and magnetometer data. The UKMO zonal winds show the presence of a wavenumber-1 16 day wave from 5 hPa (~37 km) confirming that this wave disturbance was generated in the lower atmosphere, and it then propagated to ionospheric heights thereby modulating the E region electric field there. The results will be discussed in the context of our current understanding of the planetary wave coupling of the equatorial atmosphere-ionosphere system.

Planetary waves, mesosphere-lower thermosphere region, equatorial ionosphere

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