

Mid-Winter Stratospheric Warming Effects on Equatorial Dynamics over Peninsular India

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Abstract : Winter stratospheric dynamics is a highly variable and spectacular field of research in middle atmosphere. It is well believed that the interaction of energetic planetary waves with mean flow causes the temperature to increase in the stratosphere and associated circulation reversal. This wave driven sudden disturbances in the polar stratosphere is defined as Sudden Stratospheric Warming. The main objective of the present work is to investigate the mid-winter major stratospheric warming events on equatorial dynamics over Peninsular India. To explore the effect of mid-winter stratospheric warming on Indian region (60oE -100oE), we have selected the winters 2003/04, 2005/06, 2008/09, 2012/13 and 2018/19. This study utilized the data from ERA-Interim Reanalysis, Outgoing Longwave Radiation (OLR) from NOAA and TRMM satellite data from NASA mission. It is observed that a sudden drop in OLR (averaged over Indian Region) occurs during the course of warming for the winters 2005/06, 2008/09 and 2018/19. But in winters 2003/04 and 2012/13, drop in OLR happens prior to the onset of major warming. Significant amplitude of planetary wave activity is observed in equatorial lower stratosphere which indicates the propagation of extra-tropical planetary waves from high latitude to equator. During the course of warming, a strong downward propagation of EP flux convergence is observed from polar to equator region. The polar westward wind reaches upto 20oN and the weak eastward wind dominates the equator during the winters 2003/04, 2005/06 and 2018/19. But in 2012/13 winter, polar westward wind reaches upto equator. The equatorial wind at 2008/09 is dominated by strong westward wind. Further detailed results will be presented in the conference.

Keywords : Equatorial dynamics, Outgoing Longwave Radiation, Sudden Stratospheric Warming, Planetary Waves

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