

LOW LATITUDE IONOSPHERIC RESPONSE TO THE GEOMAGNETIC STORM OF 15TH MAY 2005: EVIDENCES FOR ELECTRODINAMICAL COUPLING BETWEEN LIGHT AND LOW LATITUDES

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Key words:

Abstract.

During geomagnetically disturbed conditions electrodynamic coupling between high and low latitude ionosphere dominates the ionospheric behavior at low and equatorial latitudes. The ionospheric electric field disturbances redistribute the plasma in the equatorial and low latitude ionosphere. We present the low latitude ionospheric behavior before, during and after the geomagnetic disturbed conditions of 15th May 2005 using Global Positioning System (GPS) - total electron content (TEC) measurements in India. Based on observed evidence, TEC enhancements a day prior to the SSC event, 14th May, is considered as poststorm enhancements as a result of the previous geomagnetic activity of 8th May 2005. The diurnal pattern of TEC at a chain of equatorial to low latitude stations show strong positive ionospheric storm phase at $\sim 12:30$ IST on 15th May. Latitudinal variation of TEC shows strong equatorial ionization anomaly (EIA) development at about the same time. Evidence, in terms of equatorial electrojet (EEJ) and magnetogram signatures, is presented for the prompt penetration of interplanetary electric field (IEF) as the cause of the positive ionospheric storm. Consequent to the storm time circulation resulting from the extra energy deposition via Joule heating over

high latitudes, compositional changes occur in the global thermosphere. The negative ionospheric storm on 17th May observed beyond certain low latitude is explained as due to the storm time neutral composition changes as observed by Global Ultraviolet Imager (GUVI) onboard the NASA Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED) satellite. The different aspects of the observed TEC behavior are discussed in detail in terms of the above physical processes to bring out the storm time electrodynamic coupling between high and low latitudes more comprehensively.