



Unusual thermosphere-ionospheric response on 18 March 2015 during St. Patrick's Day storm

SK Samin Kader and Nirvikar Dashora
National Atmospheric Research Laboratory, Gadanki, India, 517112. e-mail: ndashora@narl.gov.in

Abstract:

A severe most storm of solar cycle 24 occurred on 17-18 March 2015 has produced dramatic effects in globally as well as in Indian sector. Various studies in recent past reported from India have emphasized upon deviations in ionosphere thermosphere system using observations of foF2, TEC and model based studies. However, enhanced and depleted TEC respectively during the forenoon and afternoon hours of 18 March 2015 make special cases for further investigation. Also the local night time ionospheric perturbations on 17 March 2015 needs to be re-examined from point of view of its effect on making a a back ground for 18 March 2015. The disturbance dynamo and composition changes during recovery phase of the storm are found to be localized in a particular local time sector. The cause of such localization has been linked with high latitude activity on night of 17 March and daytime of 18 March 2015 in Indian and Indonesian sectors. A robust analysis of TEC data from 28 GPS stations located along the two longitude sectors in Indian and Indonesian regions has revealed a characteristic coupling between high and low latitudes thermosphere that has also been substantiated using simultaneous satellite observations from DMSP, TIMED-GUVI, SWARM and C/NOFS missions. The auroral particle precipitation in dayside magnetosphere as well as formation of R1 and R2 currents in day and night side during both the 24 UT intervals of 17 and 18 March have been analyzed to obtain a longitude specific generation of prompt penetration electric field. Also, the situations are examined for specific local time distribution of disturbance dynamo effect that has affected the Indian sector differently between forenoon and afternoon of 18 March 2015. The results show a highly localized effect of substorm during night of 17 March 2015 that caused subdued electrojet in forenoon and counter electrojet in afternoon of 18 March 2015.