



Contribution ID: 374

Type: **Poster Presentation**

Ionospheric response during the geomagnetic storm events on 24-27 July 2004: Long-duration positive storm effect

Thursday, 14 July 2011 17:00 (2 hours)

Ionospheric storms represent large global disturbances in the ionospheric F2 region electron density in response to geomagnetic storms. The mechanisms for generation of negative storms are well understood and accepted. In contrast, positive storms show different characteristics and have not been fully understood. In this study, we investigate the ionospheric response during the geomagnetic storm events on 24-27 July 2004 using a multi-instrument approach. The period was characterised by strong geomagnetic activity that produced a positive ionospheric total electron content (TEC) effect over a four day period, but the most significant enhancements (with respect to the quiet day reference) were observed on 25 and 27 July and are presented here. It is noted that the enhancement on 25 July (40 TECU) was about twice as high as that observed on 27 July, even-though the later day was more geomagnetically disturbed. The positive storm enhancement on 25 July lasted over 9 hours and that on 27 July lasted about 7 hours, thus can both be classified as long-duration positive storm effects. Also, IMF Bz had a southward orientation for more than 15 hours on 25 July and could have been the mean by which energy was continuously fed into the magnetosphere. The DMSP F15 satellite which flew over the region of positive storm also observed the enhancement. In addition, the F-region critical frequency (foF2) values observed at two ionosonde stations showed marked positive responses and were associated with increase in ionospheric height.

Level (Hons, MSc, PhD, other)?

PhD

Consider for a student award (Yes / No)?

yes

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

yes

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Session Classification: Poster2

Track Classification: Track D2 - Space Science