



Comparison between the effect of two geomagnetic storms with the same seasonal and daily characteristics and different intensity on the European ionosphere.

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This work presents an analysis of the ionospheric disturbance caused by two geomagnetic storms occurred on the same day, 17th March, but one in 2013 and other in 2015. The greatest intensity of both storms occurs after sunset when geomagnetic indexes (Dst index, Kp and Ap) reached the peak values. Both geomagnetic storms can be classified as intense according to the Dst index criteria. The storm of March 17, 2015, (“St Patrick’s storm”), can be considered even “severe” because the Dst index dropped off -200nT. The solar origins of both geomagnetic storms were magnetic filament eruptions followed by Coronal Mass Ejections, CME.

The ionospheric behavior has been studied through the total electron content, TEC. This parameter is obtained from RINEX files processed using the calibration technique developed by Prof. Luigi Ciraolo. RINEX files from selected GNSS stations on Europe belonging to International GPS Service, IGS, and EUREF Permanent Network, have been used. The calibration technique assumes the ionospheric thin shell model to obtain vertical total electron content (vTEC) from slant total electron content (sTEC) at the Ionospheric Pierce Point. The data were obtained in periods of the geomagnetic storms and during quite days surrounding the storms days, at 1 minute sampling.

The behavior of the ionosphere during the two geomagnetic storms was similar. In both cases, a positive ionospheric storm, defined as an increase on the TEC, occurred during the main phase of the geomagnetic storms on 17th of March. These increases were followed by a negative ionospheric storm, a decreasing of TEC, in the recuperation phase. However, in the event of 2015, the positive ionospheric storm of the main phase had more intensity but the same duration than that of 2013 and for the negative ionospheric storm both, intensity and duration, were largest in 2015 than in 2013.