St Patrick's Day storms and GPS-TEC response at some African Low-latitude stations

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Abstract

The 2015 St. Patrick's Day storm, which is one of the most intense geomagnetic storm in this present solar cycle (SYM-H = -213nT), as well as the similar event in 2013 (SYM-H = -132nT). We investigated the response of the Total Electron Content (TEC) derived from four (4) Global Positioning System (GPS) measurements in African low latitude region during these two (2) events. Analysis of the TEC data revealed larger magnitude disturbed time variation from quiet-time average behavior in 2015 than 2013, while the deviation is larger during the recovery phase than the main phase for both storm events. There was TEC enhancements at Libreville (NKLG) during the minimum depression of SYM-H and at Malindi (MAL2) and Lusaka (ZAMB) during the prenoon periods of the first day of the recovery phase. The enhancement episodes dominates at the equatorial stations while depletion episodes dominates at the low-latitude station during the 2013 recovery phase. In 2015, depletion episodes occurred during the minimum downward excursion period, the postnoon and postsunset periods of the first recovery day at the equatorial stations and enhancement episodes observed at the prenoon. Negative storm phases dominates the remaining recovery days in the low latitude stations of MBAR and MAL2, extending for about 36 hours, particularly around the midday, post-sunset and midnight. Comparison with observations from other works revealed distinct responses at different sectors.

Keyword: *Low-latitude ionosphere, Ionospheric storms, GPS- TEC, African sector*