Investigation of positive ionosphere storms observed over Antarctica sector during the geomagnetic activity of 26-27 September 2011

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The ionospheric positive storms can be produced by several physical mechanisms, while the negative ones are associated with O/N2 density ratio decrease. To investigate the ionosphere response during a moderate geomagnetic storm we considered the GPS-TEC, ionosonde and riometer measurements in Antarctica, which were compared with the surface magnetic field.

The vertical electron content (VTEC), cosmic noise absorption (CNA) and F region parameters (foF2 and h'F) at middle latitudes were obtained at Comandante Ferraz Brazilian Antarctic Station (EACF, 62.1°S 58.4°W). At high latitude the ionospheric behavior was estimated from CNA measurements at South Pole, which were compared with the surface magnetic field and the auroral electrojact index. If possible, the ionospheric storm will be also investigated at other Antarctic latitudes and longitudes. The observational results at EACF show one strong positive ionospheric storm from GPS-TEC and ionosonde measurements during the daytime hours during the geomagnetic storm main phase. The ionospheric storm also shows significant CNA during the geomagnetic storm main phase as detected at 30 MHz at EACF, and at 30 and 50 MHz at South Pole. The CNA measured at South Pole shows variations in close association with local surface magnetic field changes.

A detailed analysis of the positive ionospheric storm at different high latitudes will help to identify the physical mechanisms involved. The auroral index show the disturbance started at ~12:30 UT suggesting the auroral region was Joule heated due the precipitation of energetic particles. This idea is reinforced by the increase of CNA and the decrease in the H component of the magnetic field observed at South Pole, as well as by the increase observed in the minimum F-region virtual height at EACF.

This study will address the objectives of the GRAPE (GNSS Research and Application for Polar Environment) SCAR Expert Group (http://www.grape.scar.org/).