The great magnetic storms of October 29-30, 2003 and their ionospheric effects observed at the equatorial ionization anomaly region

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The solar winds ejected from the coronal holes or the coronal mass ejection (CME) during solar flares form magnetic clouds and high speed streams, which may hit magnetosphere and ionosphere of the Earth, and induce many complex phenomena including geomagnetic storms. The huge injected energy accompanied with the geomagnetic storms will result in thermospheric and ionospheric storms. The ionosphere during the storms will change in complex ways, and the electron densities. The electron densities may increase or decrease and the height of the ionosphere may change too. Due to the complexity of ionospheric storms, some storms are different from the other, especially at equatorial ionization anomaly region. The ionospheric storms are far from being fully understood, so case studies are still crucial to the understanding of ionospheric storms. The 29-30 October, 2003 “Halloween” storms event have been an object of a close attention of the scientific community. The various aspects of this event have been well documented by a large number of observations. Thus, complex studies based on very different measuring techniques and instruments will contribute to an improved understanding of solar-terrestrial relationships. These studies are of great practical importance because severe storms may degrade radio communications, cause power blackouts. We will present the ionospheric response to the storms using the ionosonde and GPS observation at Indonesia and Taiwan which are located in the north and south equatorial ionization anomaly region, respectively. During the storm recovery phase on 30 October, the ionospheric parameters such as foF2, NmF2 and vertical TEC are decrease. It is interesting to note that the decreasing of those parameters is occurred more significant in the south compared to the north equatorial ionization anomaly region. We compared the results with the TIEGCM simulated TEC and show reasonable agreement between the results and the model values.