Simulation of the low latitude ionosphere response to disturbed winds and electric fields: Brazilian region

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Modeling the ionosphere during disturbed periods is one of the most challenging tasks due to the complexity of the phenomena that affect the electric fields and the thermosphere environment as a whole. It is well known that depending on the direction of the interplanetary magnetic field disturbance electric fields (undershielding or overshielding) can penetrate from high to low latitudes causing significant disturbances in the electron density distribution and in the equatorial ionization anomaly (EIA) development. Besides that, the large amount of energy deposited in the polar region during disturbed periods will be responsible for the generation of disturbed winds that will flow towards the equator where they produce a disturbance dynamo which also affects the EIA density distribution. The TIDs and TADs are also sources of disturbances that propagate at high velocity reaching the equator 2-3 hours after the beginning of the magnetic storm. In this work we use the Sheffield University Plasmasphere-Ionosphere Model at INPE (SUPIM-INPE), to simulate the drastic effects that were observed at the low latitude ionosphere in the Brazilian region during a very intense magnetic storm event. A few models are tested for the disturbed electric field and for the disturbed wind. The simulation results showed that the observations are better explained when considering a traveling waveform disturbance propagating from north to south at a velocity of the order of 200 m/s.

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