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Ionospheric mid-latitude response to solar wind discontinuities

Costel Munteanu (1,2,3), Zbysek Mosna (4,5), Daniel Kouba (4,5), Marius Echim (3,6)

(1) Department of Physics, University of Oulu, Finland, (2) Department of Physics, University of Bucharest, Romania, (3) Institute of Space Science, Magurele, Romania, (4) Institute of the Atmospheric Physics, Academy of Sciences of the Czech Republic, (5) Faculty of Mathematics and Physics, Charles University, Czech Republic, (6) Belgian Institute of Space Aeronomy, Brussels, Belgium

We have compiled a database of 356 discontinuities detected by both the Advanced Composition Explorer ACE) and Cluster satellites in the solar wind between 2001-2012 and analyzed their ionospheric response. Each discontinuity of the data base is defined by a change of at least 5 nT in less than 5 min in one or more components of the interplanetary magnetic field (IMF). The discontinuities are observed in January-April every year, when Cluster enters the solar wind. The ionospheric effects of solar wind discontinuities are investigated by checking the variations of critical frequencies foF2, the heights of the F layer and the ionospheric plasma dynamics recorded using ground measurement with a time resolution of 15 minutes from mid-latitude digisondes located in Czech Republic. The time delay between solar wind input and the ionospheric response is analyzed using the characteristics and the shape of the ionograms. The geoeffectiveness of the solar wind discontinuities is expressed as correlation between key plasma parameters (e,g, the solar wind velocity, magnetic jump across the discontinuity) and the ionospheric variations. Solar cycle effects are also discussed.