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Comparisons between observations and simulations of solar wind magnetic field reversals BRETT SCHOCK, SPENCER DURRENBERGER, ROBERT BRUNTZ, RAMON LOPEZ, University of Texas at Arlington — Computer simulations are essential to our pursuit of a greater understanding of the space that surrounds our planet, including the interaction of the solar wind and the Earth's magnetic field – the magnetosphere. These simulations incorporate years of knowledge obtained by physicists on the nature of the solar wind, a plasma of particles streaming from the sun that can greatly affect the satellites and power grids that we depend on for much of modern life. Testing of the simulations with observed data helps to validate existing theories and refine the computer models to better simulate reality and provide physicists, commercial and governmental satellite operators with critical information on the potential negative effects of "space weather." Several quick and significant reversals in the predominant direction of the magnetic field carried by the solar wind, events that can cause dramatic changes in the magnetosphere which satellite operators must be aware of, were identified in otherwise steady observational data. These data were compared to simulations of the same events, using the Lyon-Fedder-Mobarry (LFM) magnetohydrodynamic (MHD) simulation. The ionospheric states during periods of steady conditions were also compared to simulation results to determine correspondence.

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