



Observations and Modeling of the June 22-23 Storm

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The magnetic storm that commenced on June 22, 2015 was one of the largest storms in the current solar cycle. The availability of in situ observations from Magnetospheric Multiscale (MMS), the Van Allen Probes (VAP), and THEMIS in the magnetosphere, field-aligned currents from AMPERE, as well as the ionospheric data from the Floating Potential Measurement Unit (FPMU) instrument suite on board the International Space Station (ISS) represents an exciting opportunity to analyze storm-related dynamics. Our real-time space weather alert system sent out a “red alert” warning users of the event 2 hours in advance, correctly predicting K_p indices greater than 8. During this event, the MMS observatories were taking measurements in the magnetotail, VAP were in the inner magnetosphere, THEMIS was on the dayside, and the ISS was orbiting at 400 km every 90 minutes. Among the initial findings are the crossing of the dayside magnetopause into the region earthward of 8 RE, strong dipolarizations in the MMS magnetometer data, and dropouts in the particle fluxes seen by the MMS FPI instrument suite. At ionospheric altitudes, the FPMU measurements of the ion densities show dramatic post-sunset depletions at equatorial latitudes that are correlated with the particle flux dropouts measured by the MMS FPI. AMPERE data show highly variable currents varying from intervals of intense high latitude currents to currents at maximum polar cap expansion to 50 deg MLAT and exceeding 20 MA. In this paper, we use numerical simulations with global magnetohydrodynamic (MHD) models run at the CCMC and the Rice Convection Model (RCM) of the inner magnetosphere in an attempt to place the observations in the context of storm-time global electrodynamics and cross-check the simulation global Birkeland currents with AMPERE distributions. We present model-predicted effects of dipolarizations and the global convection on the inner magnetosphere via data-model comparison. We show comparisons of ion injections and ionospheric conditions versus the CCMC model predictions.