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Simultaneous Remote Observations of Intense Reconnection Effects by MMS and DMSP Spacecraft During Storm-time Substorms

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During a magnetic storm on 23 June 2015, several very intense substorm took place whose signatures were observed by various spacecraft including MMS and DMSP. At the time of interest, MMS was located duskward of 22h MLT, during an inward crossing of the expanding plasma sheet boundary. A poleward-expanding auroral bulge boundary was crossed inwards by DMSP F18 at 23.5h MLT. Both spacecraft consistently observed a set of signatures as they simultaneously crossed the reconnection separatrix layer during this very intense reconnection event, including: 1) Energy dispersion of the energetic electrons travelling earthwards, accompanied with unusually high (10keV) electron energies in the vicinity of the separatrix, 2) Intense inward convection of the magnetic field lines $\sim$ 4mV/m at MMS location, and 3) Energy dispersion of polar rain electrons, with high-energy cutoff. The high temporal resolution measurements by MMS provide unprecedented observations of the low-energy cutoff in the earthward moving electrons. We discuss the relevance of the energy dispersion of the electrons and the evolution in pitch angle distribution, to the spatial and temporal evolution of plasma sheet, resulting from this magnetic reconnection.