Pre and Post Storm Energetic Electron Observations in the Inner Magnetosphere

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A critical piece of information that is needed to understand the transport and acceleration of electron in the inner magnetosphere is the radial gradient of the phase space density (PSD) at constant first and second invariants. We use the detailed energetic electron angular and spectral data from SCATHA observations combined with magnetic field measurements and models to determine the PSD profiles for a range of first and second invariant values. In particular, we examine the SCATHA electron radial profiles to set the pre storm conditions and monitor the changes following storms. The SCATHA satellite provides electron observations covering the energy range from 40 keV to a few MeV over a radial distance of 5.2 to 7.2 Re geocentric near the magnetic equator. As an example, during the May 2, 1986 storm, the CATHA data for the poster main-phase electron flux rise, showed that the PSD radial profile at M=300 MeV/G is relatively flat in the L*=5.5-6 range and falling for L*=6.7.5, indicating a possible peak in PSD below GEO altitudes. At M=2000-2500 MeV/G the PSD radial gradient was positive over the full L*=5.5-7.5 range consistent with an external equator. The observations provide a view of the energetic particles from the source region, beyond geosynchronous, down to SCATHA perigee at 5.5.as it traverses the dayside magnetosphere. The post storm PSD radial profiles for the L*=5.5-7.5 region will be presented for a wide range of M and K values to show the trends. The results will be discussed in terms of the implications for electron transport and energization processes.