Supporting Information for

"Fast diffusion of ultra-relativistic electrons in the outer radiation belt: 17 March 2015 storm event"

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Contents

Introduction

The following supplemental figures are useful for context in the manuscript with which they are submitted.

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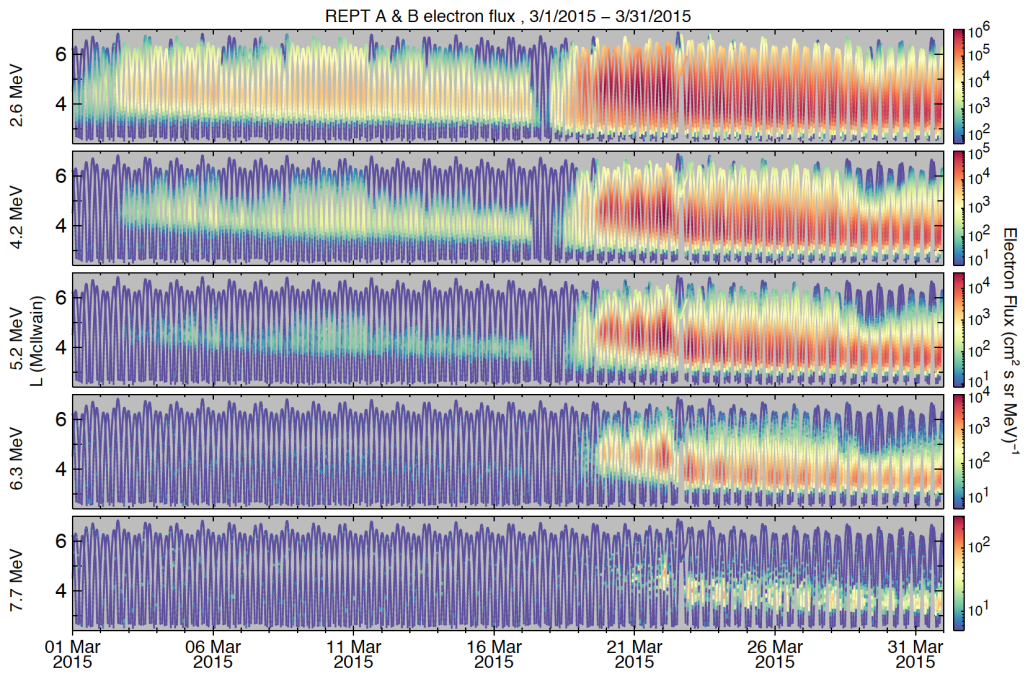

Figure 1. Electron flux for 5 energy channels of the REPT instruments covering 2.6 - 7.7 MeV for the time period of 01 March 2015 through 31 March 2015; plotted in L-shell versus time format where color indicates intensity. Particle enhancements in the higher energies appear after 19 March and show longer delays with increasing energy, up to 7.7 MeV.

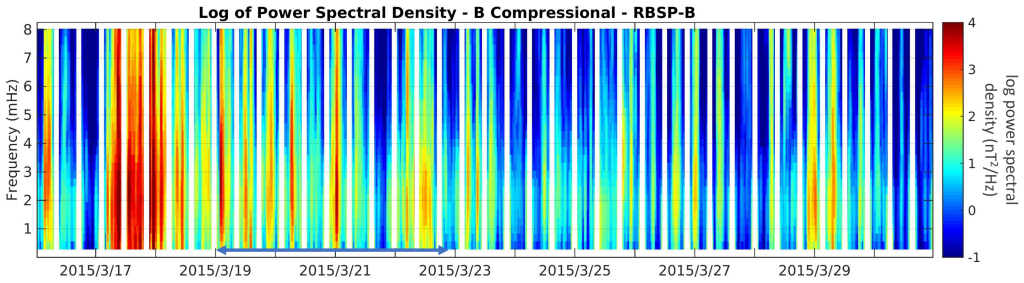

Figure 2. Power spectral density of *in situ* magnetic field measurements within the ULF frequency range from 0.28 mHz to 8.03 mHz for Van Allen Probe B from 16 March through 30 March 2015 for the compressional component of B. Blue arrow indicates time of fast radial diffusion as observed in high-energy particle data.

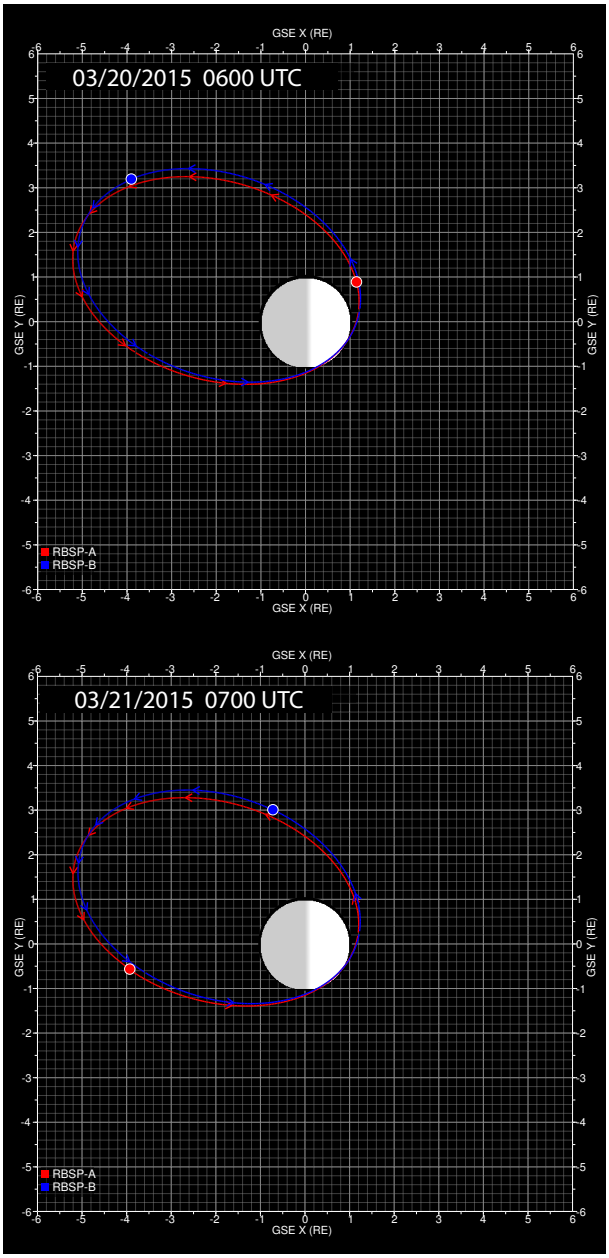

Figure 3. Orbit and location of Van Allen Probes A and B in the GSE X-Y plane for two different times, 20 March 2015 0600 UT and 21 March 2015 0700 UT, illustrating the separation possible in radial distance and MLT during this phase of the mission.

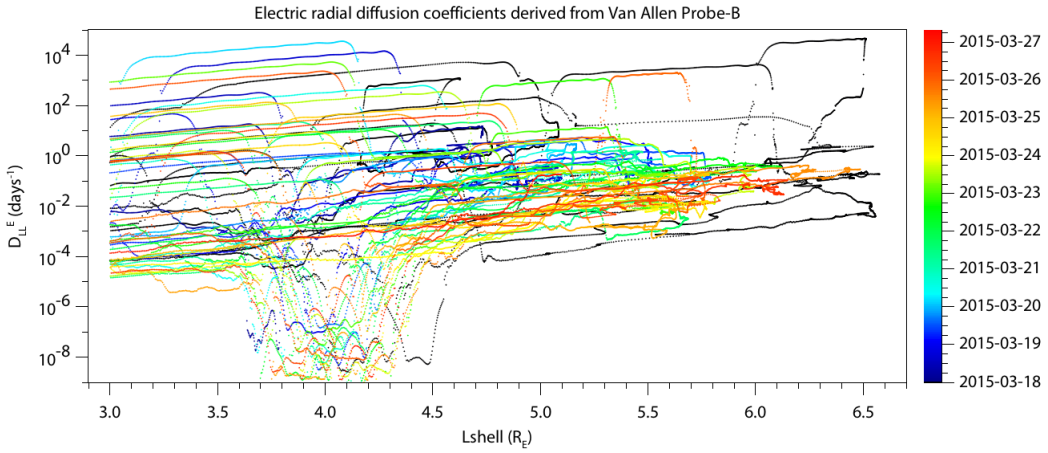

Figure 4. Electric radial diffusion coefficients, D_{LL}^E, for first adiabatic invariant μ=8011 MeV/G derived from *in situ* electric field measurements on Van Allen Probe B (chosen for the better quality from B instruments); otherwise identical format to Figure 4. The noisiness in the data results from three factors: (1) spacecraft charging events from elevated electron fluxes likely affect the electric field measurements during this time; (2) the electric field is changing over the duration of an orbit, but the FFT is taken over a full inbound or outbound pass; and (3) Level 2 electric field data were used for the analysis since they were the highest level available at the time, but are at a slightly lower cadence than Level 3, as was used with the magnetic field data for Figure 4, thus contributing to a more step-wise change in magnitude over Lshell.