Global Variability of the Outer Radiation Belt: Highlights from Van Allen Probes

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Charged particles can be trapped in the near-Earth space where the planetary magnetic field is approximately dipolar. Trapped electrons accelerated to relativistic energies are (on average) organized in two populations, the inner and the outer belts, separated by a slot region. During increased solar activity the state of the outer belt can highly dynamic: electron intensities can vary by orders of magnitude on the timescales from minutes to days. Understanding dynamic processes in the outer belt is essential for developing our understanding of general energization and transport processes which operate across the universe. Recent measurements from the twin-spacecraft Van Allen Probes mission showed that geomagnetic storms can produce deep depletions of electron intensities across the entire extent of the belt, followed by rapid rebuilding of electron intensities to the levels exceeding their pre-storm values. In this talk we review how our understanding of global variability of the outer belt has evolved with development of better physical models and new multi-spacecraft observational capabilities. We mainly focus on the properties of radial transport and electron acceleration, including recently results on non-diffusive transport and drift orbit bifurcations, and observations and analysis of rapid storm-time dropouts of electrons from the outer belt.