



## **Simulation Study of Particle Acceleration, Transport, and Loss in the Radiation Belts**

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We present studies of particle acceleration, transport and loss in the Earth's radiation belts. Recently, the Comprehensive Ring Current Model (CRCM) and the Radiation Belt Environment (RBE) model were merged to form a Comprehensive Inner Magnetosphere Ionosphere (CIMI) Model. CIMI solves for many essential quantities in the inner magnetosphere, including: ion and electron distributions in the ring current and radiation belts, plasmaspheric density, Region 2 currents and the convection potential. It incorporates whister-mode chorus and hiss wave diffusion of energetic electrons in energy, pitch-angle, and cross terms. CIMI thus represents a comprehensive model that considers the effects of the ring current and plasmasphere on the radiation belts. We performed a CIMI simulation for the storm on 5-8 April 2010, and then compared our results with data from multi-points observations from the TWINS, Akebono, THEMIS, Cluster and GOES satellites. In this paper, we will discuss global magnetospheric processes and local wave-particle interactions controlling the storm-time dynamics and variability of the outer radiation belt. We will also demonstrate how CIMI can be a powerful tool for analyzing and interpreting data from the new Van Allen Probes mission.