CIMI simulations with recently developed multi-parameter chorus and plasmaspheric hiss models

Homayon Aryan (1), David Sibeck (1), Suk-bin Kang (1), Michael Balikhin (2), and Mei-ching Fok (1)

(1) NASA Goddard Space Flight Center, Silver Spring, United States (aryan.homayon@gmail.com), (2) ACSE, University of Sheffield, Sheffield, United Kingdom.

Simulation studies of the Earth's radiation belts are very useful in understanding the acceleration and loss of energetic particles. The Comprehensive Inner Magnetosphere-Ionosphere (CIMI) model considers the effects of the ring current and plasmasphere on the radiation belts. CIMI was formed by merging the Comprehensive Ring Current Model (CRCM) and the Radiation Belt Environment (RBE) model to solves for many essential quantities in the inner magnetosphere, including radiation belt enhancements and dropouts. It incorporates chorus and plasmaspheric hiss wave diffusion of energetic electrons in energy, pitch angle, and cross terms. Usually the chorus and plasmaspheric hiss models used in CIMI are based on single-parameter geomagnetic index (AE). Here we integrate recently developed multi-parameter chorus and plasmaspheric hiss wave models based on geomagnetic index and solar wind parameters. We then perform CIMI simulations for different storms and compare the results with data from the Van Allen Probes and the Two Wide-angle Imaging Neutral-atom Spectrometers and Akebono satellites. We find that the CIMI simulations with multi-parameter chorus and plasmaspheric hiss wave models are more comparable to data than the single-parameter wave models.