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Space Weather Prediction and Protection of Space Missions from Its Effects (3)

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MODELLING THE ELECTRON RADIATION BELT DURING EXTREME EVENTS

Abstract

During extreme magnetic storms with a planetary index around Kp=9, the magnetic field is so distorted that it is nearly impossible to obtain a global model of the radiation environment. During that events, particles are accelerated and transported far inside the magnetosphere, filling the slot region. We wanted to obtain a global view of the electron radiation after such an event, for mission specification purposes. To do that, averages of nearly equatorial electron measurements over a period of one week following different extreme events were sorted according to the energy and L values. First, the measurements of the CRRES satellite were processed during 3 extreme events (in 1991). Ratio between those measurements and the AE8 flux were determined, leading to a model of worst case electron flux for energy between 100keV and 7MeV. This model was checked using measurements on board the ICO satellite for 6 more events during the period 2001-2005. This model corresponds to a simple analytical relation giving the flux ratio relative to the AE8 flux as a function of L and energy. It can be extended to every latitude and give a worst case environment for extreme events