Radiation Belt Electron's Flux Dropout During Intense Geomagnetic Storms

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The solar structures that eventually reach the Earth, causing intense geomagnetic storms, modify the geomagnetic field where the electrons are trapped in the Van Allen radiation belts. The way in which intense geomagnetic storms may affect the variability of the relativistic electron fluxes in the radiation belts is not completely understood, and here we address this point. We used data from the Relativistic Electron-Proton Telescope (REPT) instrument aboard NASA's twin Van Allen Probes. To identify and quantize the intensity of storms we used the symmetric index, SYM-H, and to identify the cause of the geomagnetic storms, we used data from the solar wind: speed, dynamic pressure and magnetic field as measured by the Advanced Composition Explorer (ACE), and Deep Space Climate Observatory (DSCOVR) satellites, which are orbiting the gravitational balance point between the Sun and the Earth. The comparison of electron fluxes in the outer radiation belts with Interplanetary Medium data showed the importance of the interplanetary magnetic field (IMF) Bz component (in Geocentric Solar Magnetospheric - GSM - coordinates) on the trapped electron flux during the occurrence of geomagnetic storms. Negative values of the IMF Bz component interconnect the interplanetary and geomagnetic fields, allowing particles to escape throughout the magnetosphere to the solar wind, causing decreases in the electron flux in periods that coincide with negative IMF Bz values. This suggests that the particles' flux in the radiation belts depends on the IMF Bz component the same way it does for the occurrence of intense geomagnetic storms. It is necessary a deeper investigation to understand the contribution of the different mechanisms of the internal and external phenomena of the Earth's magnetosphere to fully understand and describe the behavior of trapped particles.

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