Geophysical Research Abstracts, Vol. 9, 04723, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04723

Characteristics of Relativistic Electron Energization and Loss in the Earth's Outer Zone

S. G. Kanekal (1), D. N. Baker (1), J. B. Blake (2), J. F. Fennell(2), R. S. Selesnick (2), D. Vassiliadis(3)

(1) LASP, inversity of Colorado, Boulder, CO, USA, (2) The Aerospace Corporation, Los Angeles, CA, USA, (3) ST at GSFC, Greenbelt, MD, USA

The relativistic electron population of the Earth's outer zone is highly dynamic showing variations in flux levels of over several orders of magnitude on time scales as short as a day. Electron flux levels are a result of a balance between energization and loss processes. Energization of electrons to relativistic energies may be by in-situ processes, e.g., wave-particle interactions or due to particle transport, i.e., radial diffusion.

We will characterize relativistic electron energization and loss examining electron enhancemnt events observed over a full solar cycle using data collected by SAMPEX and Polar spacecraft. SAMPEX measurements cover the entire outer zone for more than a decade from mid 1992 to mid 2004 and Polar covers the time period from mid 1996 to the present.

We will present features of electron energization and loss events such as temporal evolution of electron spectra, electron flux isotropization, and electron decay and rise time scales. We will also characterize classes of electron events driven by distinct solar wind drivers such as high speed solar wind streams and coronal mass ejections.Temporal evolution of electron spectra and flux isotropization are important discriminators of models of electron energization in the Earth's outer zone. For example, radial diffusion preferentially energizes electrons of large equatorial pitch angles whereas some in-situ wave-particle energization mechanisms include concomittant pitch angle scattering leading to rapid flux isotropization. The systematics of electron energization due to different drivers may help identify dominant mechanism(s) of these classes of events.