QUANTITATIVE LOSS RATE OF RADIATION BELT ELECTRONS DETERMINED FROM SAMPEX MEASUREMENTS AND MODELING

XINLIN LI 1, Weichao Tu 1, Mark Looper 2, and Richard Selesnick 2

1. Laboratory of Atmospheric and Space Physics and Department of Aerospace Engineering Sciences, University of Colorado at Boulder, USA.
2. Aerospace Corporation, Los Angeles, California, USA

SAMPEX orbits the Earth 15 times each day in a high inclination orbit and has been providing measurements of radiation belt electrons since its launch in 1992. Because of its low altitude and large geometric factors and the fast time resolution of its detectors, SAMPEX data are ideally suited for determining losses of the electrons to the atmosphere. Since the overall flux of the electrons, and their variability, are controlled by the competition between source and loss processes, a detailed understanding of the loss is a required step towards developing any comprehensive models for radiation belt electron dynamics, because only when the loss rate is accurately determined will it be possible to appropriately include transport and acceleration processes to compensate for the losses and model the observed enhancements. In this presentation, we will focus on a recent event in February of 2009 when an over two orders of magnitude of MeV electron enhancement was clearly measured at geosynchronous orbit after a long lasting period of ever-low MeV electron flux. We will apply a Drift-Diffusion Model, which considers the effects of azimuthal drifts and pitch angle diffusion, to the SAMPEX data to acquire the quantitative information about the loss rate as functions of energy and pitch angle of radiation belt electrons.

Loss Rate, Radiation Belt Electrons, SAMPEX Observation

Xinlin Li, Laboratory of Atmospheric and Space Physics and Department of Aerospace Engineering Sciences, University of Colorado at Boulder, USA.
email: lix@lasp.colorado.edu