Geophysical Research Abstracts
Vol. 18, EGU2016-3939, 2016
EGU General Assembly 2016

Low energy electrons in the inner Earth's magnetosphere

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The fluxes of electrons with energies < 100 keV are not usually analyzed and modeled in details when studying the electron radiation belts. These fluxes constitute the low energy part of the seed population, which is critically important for radiation belt dynamics. Moreover, energetic electrons with energies less than about 100 keV are responsible for hazardous space-weather phenomena such as surface charging. The electron flux at these energies varies highly with geomagnetic activity and even during quiet-time periods. Significant variations in the low-energy electrons can be seen during isolated substorms, not related to any storm periods. Moreover, electron flux variations depend on the electron energy. Statistical analysis of AMC 12 CEASE II ESA instrument data (5-50 keV) and GOES MAGED data (40, 75, 150 keV) have revealed that electron fluxes increase by the same order of magnitude during isolated substorms with 200 nT of AE index and storm-time substorms with 1200 nT of AE index. If substorms are represented as electromagnetic pulses which transport and accelerate electrons additionally, how are their amplitudes determined, if not related directly to a substorm's strength? Another factor of crucial importance is the specification of boundary conditions in the electron plasma sheet. We developed a new model for electron number density and temperature in the plasma sheet as dependent on solar wind and IMF conditions based on THEMIS data analysis. We present observational and modeling results on low energy electrons in the inner magnetosphere with newly-developed, time-dependent boundary conditions with a special focus on the role of substorms for electron transport and acceleration.