Substorm Energetic Electron Injection Flux from a Dipolarization Model[1]

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Abstract

During quiet conditions energetic electrons are found in two spatially confined regions around the earth. The inner region is very stable but the outer region which overlaps geosynchronous orbit shows large variation during active periods. The variability of these high energy electrons is then of great interest due to the significance of the geosynchronous region. It is shown that the phase space density of the plasma sheet, a region of of plasma on magnetic field lines farther than $9R_E$ from the Earth, is sufficient to supply the high energy radiation belt electrons. Substorm dipolarizations are a mechanism by which the plasma sheet electrons can be transported to geosynchronous orbit. Further energization of these transported electrons by other mechanisms, such as whistler-wave electron interactions could well account for the dangerous high energy electrons. We estimate using the ten parameter dipolarization model of *Li et al.* [1], a reasonable flux of electrons that can be transported and trapped in the geosynchronous region. The major results of substorm dipolarizations using the *Li et al.* model are reviewed and the effect of parameter variations of the model are given.

[1] Xinlin Li, D. N. Baker, M. Temerin, G. D. Reeves, R. D. Belian. Simulation of dispersionless injections and drift echoes of energetic electrons associated with substorms. GRL **25**, 20, 3763-3766.

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