Modeling energetic particles generated by substorm dipolarizations.

*Konstantin Kabin[1], German Kalugin[1], Eric Donovan[2], Emma Spanswick[2]

1. Royal Military College of Canada, 2. The University of Calgary

We describe a novel model of magnetotail which is easily controlled by several adjustable parameters, such as the thickness of the tail and the location of transition from dipole-like to tail-like magnetic field lines. The model is fully three-dimensional and includes the day-night asymmetry of the terrestrial magnetosphere, although the field lines are contained in the meridional planes. This model is well suited to studies of the magnetotail dipolarizations which we consider to be associated with the movements of the transition between dipole-like and tail-like field lines. Induced electric fields generated by this reconfiguration of the magnetotail are capable of energizing electrons and ions. In some cases, the energy of the particles can increase by a factor of 25 or more. These electric fields are also responsible for transport of the energized particles closer to the Earth where they can be observed, either in-situ by the satellites, or indirectly by ground-based instruments, such as riometers. Results of our calculations suggest that this scenario provides a plausible explanation of substorm particles injections.

Keywords: energetic particles in the inner magnetosphere, magnetotail modeling, substorm dipolarizations, substorm particle injections

