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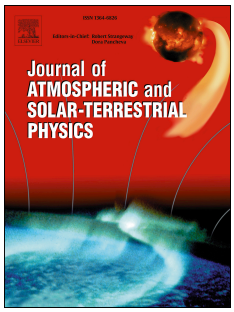

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Particle tracing modeling of ion fluxes at geosynchronous orbit

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Abstract

The first results of a coupled MHD/particle tracing method to evaluate particle fluxes in the inner magnetosphere are presented. This setup is capable of capturing the earthward particle acceleration process resulting from dipolarization events in the tail region of the magnetosphere. On the period of study, the MHD code was able to capture a dipolarization event and the particle tracing algorithm was able to capture the results of these disturbances and calculate proton fluxes in the night side geosynchronous orbit region. The simulation captured dispersionless injections as well as the energy dispersion signatures that are frequently observed by satellites at geosynchronous orbit. Currently, ring current models rely on Maxwellian-type distributions based on either empirical flux values or sparse satellite data for their boundary conditions close to geosynchronous orbit. Despite some differences in intensity and timing, the setup presented here is able to capture substorm injections, which represents an improvement regarding a reverse way of coupling these ring current models with MHD codes through the use of boundary conditions.

Keywords: geosynchronous fluxes, substorms, particle tracing,
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