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Modeling Electron Precipitation in a Non-dipole Field

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The Earth's magnetic field is a complex entity with a heterogeneous structure, exhibiting varying strengths across different coordinates. Of particular interest is the South Atlantic Anomaly (SAA), a region characterized by a strong magnetic field and intense precipitation processes. Accurate modeling of this area demands a comprehensive approach, involving the calculation of magnetic fields and bounce times. Incorporating realistic field models, such as T89 for external and IGRF for internal fields, is essential for correct modeling. Furthermore, dividing the loss cone into drift and bounce components, correlated with geomagnetic latitudes, accounts for the disparate numbers of precipitated particles. By simulating a geomagnetic storm occurring in 2016 and validating our findings against observations from the ELFIN-L instrument on board the Lomonosov satellite in low-Earth orbit, we studied and compared precipitation activity during this event. Our investigation underscores the significance of incorporating the non-dipole loss cone model, leading to improved estimations of precipitated flux into the atmosphere. Moreover, our study unveils a noteworthy connection between the magnetospheric waves activity and precipitation at low latitudes.

Solicited or Contributed

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