Correction to "Self-Consistent Magnetosphere-Ionosphere Coupling: Theoretical Studies"

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INDEX TERMS: 2736 Magnetospheric Physics: Magnetosphere/ionosphere interactions; 7807 Space Plasma Physics: Charged particle motion and acceleration; 2753 Magnetospheric Physics: Numerical modeling; 2730 Magnetospheric Physics: Magnetosphere—inner; 9900 Corrections; *KEYWORDS:* magnetic storms, ring current, electric fields, numerical simulations

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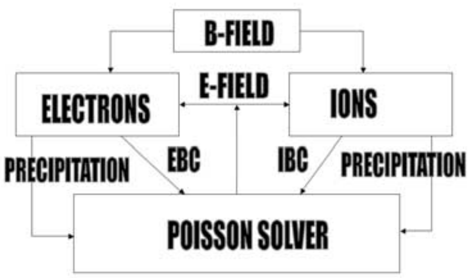
[1] In the paper "Self-Consistent Magnetosphere-Ionosphere Coupling: Theoretical Studies" by G. V. Khazanov et al. (*Journal of Geophysical Research, 108*(A3), 1122, doi:10.1029/2002JA009624, 2003), Figure 1 contained a labeling error. The corrected figure is given here, along with a reiteration of the description of the computational flow of the model.

[2] In the original paper, a self-consistent ring current (RC) model is described that couples the electron and ion magnetospheric dynamics with the calculation of the electric field. Two new features were taken into account in order to close the self-consistent magnetosphere-ionosphere coupling loop. First, in addition to the RC ions, we have solved an electron kinetic equation in our model. Second, we have calculated the height integrated ionospheric conductances as a function of the precipitated high energy magnetospheric electrons and ions that are produced by our model. The self-consistent inclusion of the hot particles in the conductance calculation results in deeper penetration of the magnetospheric electric field compared to analytical models. In addition, a slight westward rotation of the potential pattern (compared to previous self-consistent results) is evident in the inner magnetosphere. These effects change the hot plasma distribution, especially by allowing increased access of plasma sheet ions and electrons to low L shells.



[3] The numerical technique employed for this study allows for a self-consistent solution of the ionosphere-magnetosphere interaction at subauroral latitudes. This is achieved by solving kinetic equations for the particle distribution in the magnetosphere simultaneously with a Poisson equation for the midlatitude ionospheric potential. A schematic diagram of the computational algorithm is shown in Figure 1. The magnetospheric particle solvers are driven by an imposed magnetic field and the self-consistent electric field. Precipitation fluxes of both electrons and ions are used to find the ionospheric conductance using the relation of *Galand and Richmond* [2001]. The solar contribution to the conductance is the same as that used by *Robinson et al.* [1987]. By considering the partial pressures from each plasma species, electron Birkeland currents (EBC) and ion Birkeland currents (IBC) are obtained and used as source/sink terms in the ionospheric current system calculation. From the potential solver, electric fields are derived that are used in the next time step of the magnetospheric solver. This coupling loop is performed every time step throughout the simulation as described in the original paper.

References

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