



Magnetospheric and ionospheric responses to two types of solar wind directional discontinuities

Andrey Samsonov (1), David Sibeck (2), Zdenek Nemecek (3), and Jana Safrankova (3)

(1) St. Petersburg State University, St. Petersburg, Russian Federation (a.samsonov@spbu.ru), (2) NASA GSFC, Greenbelt, MD, USA, (3) Charles University, Prague, Czech Republic

We use global MHD simulations to study magnetospheric and ionospheric responses to two categories of solar wind discontinuities. In both categories, the orientation of the interplanetary magnetic field (IMF) changes significantly while solar wind plasma parameters remain relatively the same. In the first category, the IMF orientation changes from non-radial to nearly radial. This results in the appearance of a foreshock upstream from the dayside bow shock. Employing previously obtained statistical results, we modify the upstream solar wind parameters in global MHD simulations to incorporate foreshock effects and demonstrate that the model predicts magnetopause distances during radial IMF intervals that are close to observations. In the second category, the IMF changes from northward to southward. Using MHD simulations, we study the propagation of the directional discontinuity through the bow shock, the reconfiguration of the magnetic field in the dayside magnetosheath, the intensification of field-aligned currents, enhanced cross polar cap potentials, and investigate the relationships between different magnetospheric parameters.