

Data assimilation experiment for reproducing the temporal evolution of the inner-magnetospheric environment

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The plasmasphere is the inner part of the magnetosphere where cold plasma is densely concentrated. The ring current is typically located just outside of the plasmasphere and it consists of high energy ions of tens of keV. Both the plasmasphere and the ring current play important roles in various physical processes in the inner magnetosphere. Although it is normally difficult to observe the global structures of the plasmasphere and the ring current, remote imaging observation from the IMAGE satellite provided the information on the global structures of the plasmasphere and the ring current. We are developing a data assimilation system for estimating temporal evolution of the plasmasphere and the ring current by exploiting the EUV and ENA imaging data from the IMAGE satellite. We have conducted a preliminary experiment using a synthetic data set. The result shows that the spatial distributions of the plasmasphere and the ring current were successfully estimated. The electric potential distribution which controls the distributions of the plasmasphere and the ring current was also well reproduced. This demonstrates that the data assimilation of the EUV and ENA imaging data is a useful tool for reproducing the global temporal evolution of the inner magnetosphere.

Keywords: ring current, plasmasphere, data assimilation, ensemble Kalman filter