Data assimilation of energetic neutral atom data for two-dimensional modeling of the magnetospheric ring current

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The inner-magnetospheric electric fields, which transport the ions into the ring current region and accelerate them at the same time, play a crucial role in the formation of the ring current. However, due to the limited observation, it is difficult to completely know the temporal evolution and the global distribution of the inner-magnetospheric electric field. We employ a data assimilation approach to overcome the lack of observation in the inner magnetosphere. We have developed a data assimilation scheme for assimilating energetic neutral atom (ENA) data from the IMAGE satellite into a two-dimensional kinetic ring current model developed by Fok and Moore (1997) using an algorithm based on the particle filter/smoother. The electric potential distribution controls the distribution of energetic ions in the ring current, and the ring current ion distribution affects ENA fluxes observed by IMAGE. Considering these causal relations, we can estimate the electric potential as well as the ring current particle fluxes from the ENA measurements. In this presentation, we introduce this data assimilation scheme. Some results of data assimilation and their implications are also discussed.