

## Trajectory tracing of ionospheric ions in the Earth's magnetosphere

# Naoki Terada[1]; Takashi Tanaka[2]; Masahito Nose[3]

[1] NICT/JST; [2] Kyushu University; [3] DACGSM, Kyoto Univ.

Recent satellite observations have revealed that the ionosphere is an important source of magnetospheric plasma.  $O^+$  ions of ionosphere origin have been shown to dominate ring current region during intense magnetic storms, while other ionospheric ions such as  $N^+$  contribute to the ring current with the ratio as high as  $N^+/O^+ \sim 0.5$ . Despite the importance of their contributions to the ring current hence to the development of geomagnetic storms, global magnetosphere models have not included them in a satisfactory manner. This is simply because they are quite computer intensive and require elaborate techniques to accommodate their kinetic effects, diverse temporal scales, anisotropy effects, etc in a global model. However, recent progresses in both computer power and numerical techniques allow us to challenge modeling of them. We have developed a particle trajectory tracing code where ionospheric ions are followed in a magnetosphere obtained by a global TVD MHD model. We will show initial results of the modeling and discuss the particle ions' distribution, energization, and contribution to the ring current by comparing Geotail/EPIC observations. A possible technique to self-consistently model the particle ions in an MHD field, i.e., particle-MHD combined model, will be also discussed.