

## Advances in planetary magnetospheric simulation with recent supercomputer systems

# Keiichiro Fukazawa[1]; Yuto Katoh[2]; Raymond J. Walker[3]

[1] ACCMS, Kyoto Univ.; [2] Dept. Geophys., Grad. Sch. Sci., Tohoku Univ.; [3] IGPP/UCLA

Planetary magnetospheres are very large, while phenomena within them occur on meso- and micro-scales. These scales range from 10s of planetary radii to kilometers. To understand dynamics in these multi-scale systems, numerical simulations need to use the supercomputer systems. We have studied the magnetospheres of Earth, Jupiter and Saturn by using global magnetohydrodynamic (MHD) simulations for a long time, however, we have not yet obtained the phenomena near the limits of the MHD approximation.

Recently we can perform our MHD simulation of Terrestrial magnetosphere with close to the MHD approximation by using the K-computer and obtained multi-scale plasma flow vorticity in the magnetosphere for the both northward and southward IMF. It is also interesting that there are dawn-dusk asymmetries in the formation of vortex.

Furthermore, we can obtain the chance to use supercomputer systems which have latest Xeon, SPARC64, and vector-type CPUs and can do the simulation of Jovian and Kronian magnetospheres with the fine grid spacing. In these simulations, it is possible to provide the magnetic field to the electron hybrid simulation as a background field. Additionally, thanks to these computer resources we can run a lot of parameter survey simulations and compare the results of the magnetosphere with observations from the HISAKI spacecraft. In this study, we will show these simulation results and what we can perform using these supercomputer resources in the future.