

Variation of heavy ions' precipitation on the Mercury's surface

Manabu Yagi[1]; Kanako Seki[2]; Yosuke Matsumoto[3]; Dominique Delcourt[4]; Francois Leblanc[5]
[1] RIKEN R-CCS; [2] Dept. Earth & Planetary Sci., Science, Univ. Tokyo; [3] Chiba University; [4] LPP, Ecole Polytechnique, CNRS; [5] LATMOS-IPSL, CNRS

Observations by MESSENGER found that Mercury's magnetosphere is analogous to the Earth's while there are several differences of the two. One of the big differences is a dipole offset which could affect to the global configuration of Mercury's magnetosphere especially making a strong north-south asymmetry. In this study, first we performed many cases of MHD simulation solving an interaction with solar wind plasma and offset dipole of Mercury. Solar wind densities are given between nominal (35cm^{-3}) and high (140cm^{-3}) with velocities for 400km/s to 800km/s, which are almost average value in the Mercury's orbit. An important parameter which could change the global structure of magnetosphere is IMF condition. IMF conditions are comes from Parker's spiral which has strong Bx component at the Mercury's orbit in addition to the ideal one which has only Bz component for comparison.

When solar wind density is nominal, the structure of Mercury's magnetosphere is not far from miniature of Earth's magnetosphere, while north-south asymmetry is outstanding because of the offset dipole. In the realistic IMF case, global configurations of magnetosphere drastically change and become more complicated structures which include stronger north-south and dawn-dusk asymmetry by strong Bx and weak By components. IMF Bx also affects to the intensity ratio of north and south cusp pressure, and By component twist the cusp region to longitudinal direction. The heavy ions' trajectories basically obey the global structure of magnetic field, so that the ions' precipitation concentrate on the "magnetic cusp" defined from MHD simulations, but the precipitation region is wider and the boundary is not clear compared to the MHD cusp. In the presentation, we will discuss more details of heavy ion precipitation pattern. The identification of global structures and ions' precipitation region especially the cusp is important not only on the understanding of magnetospheric physics itself, but also making a proposal to the observational plan of spacecraft such as Bepi-Colombo.