Plasma transport across a boundary: Venus, Mercury, and Earth global magnetospheric simulation perspective

Naoki Terada[1]; Masaki Fujimoto[2]; Tatsuki Ogino[3]; Hiroyuki Shinagawa[3]

[1] STE Lab., Nagoya Univ.; [2] DEPS, TITECH; [3] STEL, Nagoya Univ.

Plasma transport processes across a boundary such as the magnetopause of the Earth and the ionopause of Venus are investigated by using solar wind-magnetosphere (solar wind-ionosphere) global simulation models. Particular emphasis is placed on an effect of obstacle shape on the plasma transport. Global hybrid simulation of the solar wind flow around an ionospheric obstacle demonstrates appearance of turbulence behind the obstacle that enhances plasma transport across a plasma boundary, the ionopause. The appearance of turbulence is also seen in a global MHD simulation of the solar wind interaction with the ionosphere of Venus when we invoke a high Reynolds number simulation. These results imply that the large obstacle having a vacant wake region produces turbulent mixing process behind obstacle. We attempt to apply this result to magnetospheric obstacles such as Hermean and Earth's magnetosphere as well. We will discuss the dependence of a magnetospheric obstacle shape on magnitudes of dipole moment and solar wind dynamic pressure and resulting effect on the plasma transport efficiency.