R006-02
Zoom meeting B ：11/1 AM1 (9:00-10:30)
09:15-09:30

The location of auroral oval depending on the tilt and precession of dipole axes deduced from global magnetosphere model

#Aoi Nakamizo[1)], Yasubumi Kubota[1)], Tsutomu Nagatsuma[1)], Takashi Tanaka[2)]
[1)]NICT,[2)]REPPU code Institute

Global magnetosphere simulation is one of the useful ways to complement observations and to know deductively what is going on in the magnetosphere-ionosphere. However, there has been much room for improvement of our simulation code to reproduce the realistic space environment. In order to simulate the magnetosphere more realistically, we introduced the inclination of the magnetic axis (tilt) and the precession between the magnetic and rotation axis, which have been coincided with each other and orthogonal to the ecliptic plane in the original REPPU code [Tanaka et al., 2015].
Although the tilt and precession may be thought to be less effective, it is expected to affect the simulation result because it alters the ionospheric conductance distribution, which largely modify the ionosphere-magnetosphere convection field through the M-I coupling processes [Nakamizo and Yoshikawa, 2019].
With this improved code, we examine how the distribution of large-scale FAC and associated conductance enhancement changes with/without the tilt and precession. Hereafter we call these regions as auroral oval. Because the location and intensity of FACs and conductances are the source of the disturbances of high-latitude ionosphere and primary energy input from the magnetosphere to the ionosphere, the improvement of predictability contributes to the practical use. We compare the locations of auroral ovals in simulations with tilt and precession (we use winter solstice conditions) and without tilt and precession (no seasonal and time dependence of conductance distribution) under the same solar wind and IMF input. In the northern hemisphere (dark winter hemisphere), the auroral oval tends to contract poleward in the dayside and expand equatorward in the nightside. This tendency become clearer for intense solar wind and IMF parameters. We discuss the result in terms of the solar wind-magnetosphere-ionosphere coupling.
References:
Tanaka, T. (2015). Substorm Auroral Dynamics Reproduced by Advanced Global Magnetosphere－Ionosphere (M?I) Coupling Simulation. In Auroral Dynamics and Space Weather (eds Y. Zhang and L.J. Paxton). doi:10.1002/9781118978719.ch13
Nakamizo, A., & Yoshikawa, A. (2019). Deformation of ionospheric potential pattern by ionospheric Hall polarization. Journal of Geophysical Research: Space Physics, 124, 7553? 7580. https://doi.org/10.1029/2018JA026013