

Study of polar cap potential saturation using global MHD simulation: Difference between steady and unsteady state

*Yasubumi Kubota¹, Tsutomu Nagatsuma¹, Mitsue Den¹, Shigeru Fujita², Aoi Nakamizo¹, Takashi Tanaka³

1. National Institute of Information and Communications Technology, 2. Meteorological College, 3. Kyushu University

The cross polar cap potential (CPCP) is a value of the convection cycle strength of a solar wind-magnetosphere-ionosphere (SW-M-I) system via Region-1 FAC. CPCP shows an almost linear relationship with the solar wind merging electric field, but it tends to be saturated when the merging electric field becomes large. Siscoe et al. [2002], by using global MHD simulation, suggested that the CPCP basically depends on solar wind electric field, dynamic pressure and ionospheric conductivity. They also suggested that CPCP saturation results from the fact that the solar wind dynamic pressure limits the amount of Region-1 FAC. Their discussion is based on steady state of simulation results, however, in actual cases, solar wind and ionosphere conductivity vary with time and accordingly the state of SW-M-I system should be changed. The purpose of this study is to investigate the cause of the CPCP saturation for time varying condition. In this presentation we will discuss the difference of CPCP saturation between steady and unsteady states.