

Toward Constructing Operational Geomagnetic Activity Forecast Model

Tsutomu Nagatsuma[1]; Manabu Kunitake[2]; Ken T. Murata[2]
[1] NICT; [2] NICT

Prediction of geomagnetic activity is one of the fundamental issues of space weather forecast. We are developing geomagnetic activity forecasting model based on the solar wind - magnetosphere - ionosphere (SW-M-I) coupling. We are operating daily space weather forecast as Regional Warning Center of Japan in International Space Environment Service (ISES). The key point of our forecasting model is ionospheric conductivity dependence of the coupling function. We have found that the efficiency of SW-M-I coupling is not constant but has a dependence of ionospheric conductivity within the polar cap. Therefore, operational forecasting model of geomagnetic activity should take into account these variations and dependence. Our model can explain the diurnal and semiannual and solar cycle variations of geomagnetic activity from solar wind parameter and F10.7 index.

We also examine the possibility of using inner heliospheric solar wind data such as STEREO data for a few days advance of geomagnetic activity forecast. Based on the comparison between ACE and STEREO data, we have found that the solar wind velocity can be predicted from the STEREO data well, but the Bz component of interplanetary magnetic field (IMF) is difficult to predict rather than the magnitude of IMF. This suggests that the probabilistic approach is needed for the mid-term geomagnetic forecast. We will introduce the future direction of our geomagnetic activity forecasting model in our presentation.