

Prediction of geomagnetic activity considering Alfvén Mach number dependence

Tsutomu Nagatsuma[1]

[1] NICT

The geomagnetic activity shows diurnal and semiannual and solar cycle variations. The cause of these variations consists of two effects. One is the periodical change of the solar wind parameters due to a variation of the geometrical condition between the solar wind and the Earth's magnetosphere. The other is the periodical change of the S-M-I coupling efficiency caused by the changing of ionospheric conductivity in the polar cap region. We have developed the empirical model for forecasting geomagnetic activity considering the change of the S-M-I coupling efficiency. This model can reproduce McIntosh effect and solar cycle dependence.

On the contrary, we have found that the efficiency of S-M-I coupling tend to be low during the low Alfvén Mach number period, from the event analysis of Nov. 2003 storm. Also, we have found that the Alfvén Mach number dependence exists independently from the solar wind electric field dependence based on the statistical analysis of PCN index.

We are developing the empirical model for considering the Alfvén Mach number dependence. Since the condition of low Alfvén Mach number tend to occur within the ICMEs, This improvement will modify the prediction of sporadic type of geomagnetic storm.