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C 会場 ：11/5　AM2 （10:45-12:30）
11:50〜12:05

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Forecast of Geomagnetic Field Disturbances Using the Empirical Model for Space Weather

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The geomagnetic field disturbance is one of the essential parameters for the space weather forecast in terms of the indicator of disturbances of the Earth's magnetosphere. The magnetospheric condition strongly depends on the solar wind variation associated, for example, coronal mass ejection and/or co-rotating interaction region. Particularly, strong solar wind inputs cause a change of the ring current, resulting a magnetic storm that can be detected as a global change of magnetic field both in space and on the ground.

The disturbance field (Dst) index, which is a parameter that measures the magnitude of the ring current, is referred to understand the magnetospheric condition. Although there are some empirical models to estimate Dst index, they have been proposed to clarify the relationship between solar wind and magnetospheric condition for the past magnetic storm. In this study, we aim to adapt the extended Burton's model (Keika et al., 2015), one of the empirical models, to the forecasting of Dst index. We also attempt to estimate K-index from estimated Dst index that commonly used as the criteria for geomagnetic disturbance alerts in Japan.

We perform a few hours forecast evaluation using the DSCOVR spacecraft data as the inputs. The estimated Dst index shows a good correlation with the observed Dst index for both the main and recovery phases, particularly during strong magnetic storms. However, the abrupt change such as sudden commencement at the beginning of magnetic storm cannot be reproduced well due to the limitation of time resolution. We also estimate K-index using the Dst index and compare with the K-index calculated from the geomagnetic field variation at Kakioka (called as Kakioka K-index). The estimated K-index overestimates comparing with Kakioka K-index because the Dst index is derived from geomagnetic field variation observed at defined four low latitude stations. We also perform a few days forecast evaluation using SUSANOO-CME data as the inputs. The decrease of Dst index estimated from SUSANOO-CME data is reproduced though it is smaller than that of the observed Dst index.

We are planning to adapt the empirical model proposed in O'Brien and McPherron (2000) to estimate the Dst index variation associated with minor-to-moderate magnetic storms. We will discuss the forecast accuracy in this presentation.