SUSANOO-Aurora Activity Forecast: Forecast of the aurora index with the real time data assimilation

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The AU/AL indices are a manifest of the global aurora activity, and their forecast is useful to recognize the future evolution of geospace. In order to forecast the aurora activity, we have developed the forecast system of the aurora index based on the prediction model of Goertz et al.(1992). The model calculates the time evolution of the aurora index using the solar wind electric fields. The real time space weather forecast system SUSANOO (Shiota et al., 2014, http://st4a.stelab.nagoya-u.ac.jp/susanoo/) has provided the next 7 days solar wind parameters at 1 AU, and we calculate the time variations of the aurora indices using the electric fields from the SUSANOO-solar wind simulation. The Goertz model includes several empirical parameters, and the forecast skill depends on the accuracy of these parameters. We have implemented the real-time data assimilation to improve these parameters by comparing the model results and the actual aurora index. The developed system consists of the hindcast and forecast stages. In the hindcast stage, prediction, smoothing and filtering in the data assimilation are performed for the previous 7 days using the data from the SUSANOO-solar wind simulation and the observed aurora index, which improves the parameters for the model. Using the estimated parameters from the hindcast stage, we calculate the time evolution of the aurora index for the next 7 days as the forecast stage. In this presentation, we will present the concept of SUSANOO-aurora activity forecast and initial results from test-operations.

Keywords: Data assimilation, Forecast, Auroral activity index