Prediction of high-energy electron flux at geosynchronous orbit using a neural network method

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In this study, we attempt to predict the high-energy electron flux after twenty-four hours using a neural network that is configured with solar wind parameters and current electron flux as inputs. We use the neural network with five inputs; one-hour average values of the solar wind speed, the IMF Bz, and the current electron flux, the 72-hour integrated epsilon-parameters, and the universal time.

We predict the electron flux in 2003, using the neural network trained using the data between 1998 and 2006. As a result, it is confirmed that the neural network can predict the increase and the diurnal variations of the electron flux during the recovery phase of the magnetic storms, while the decrease of the electron flux during the main phase are less correlated with the observed electron flux. We compare the prediction performance of the four-input neural network with that of the five-input neural network. According to the result of the comparisons, it is concluded that the solar wind speed and the current electron flux are the predominant inputs for the present neural network.