

Real-time solar wind simulation for space weather forecast at aurora3d.jp

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<http://aurora3d.jp>

We developed a 3D-MHD solar wind simulation for space weather forecast purpose. The solar wind model is developed from a coronal model of Shiota et al. (2010), with a spherical Ying-Yang grid system (Kageyama) and the Riemann solver of HLLD scheme (Miyoshi and Kusano, 2005), using an inner boundary condition as used by Kataoka et al. (2009). The outer boundary is set at the Mars position. As the input data, we are using only solar magnetic field data obtained from GONG synoptic map (<http://gong.nso.edu/data/magmap/index.html>) for creating the global solar wind speed map first. The expansion factor of the magnetic field is calculated based on the potential field, and the solar wind speed is set to be proportional to the expansion factor, as suggested by Arge and Pizzo (2000). The other MHD parameters are constructed as the functions of solar wind speed, using the empirical relationship as suggested by Hayashi et al. (2003). As the output, real-time solar wind forecast map is published everyday at aurora3d.jp. The time series of solar wind MHD parameters are obtained at any planets or spacecraft. Using the data, we are forecasting aurora activities at aurora3d.jp. Radiation belt simulation [Miyoshi et al., 2004] is also operated in real-time manner. Further development would be the automatic coronal mass ejections. Some validation results of our aurora3d.jp forecast are reported.