A30a Development of automatic daily MHD simulation of inner heliosphere

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MHD modeling of the solar wind and coronal mass ejections (CMEs) is important to understand the solar-terrestrial environment and to establish space weather forecast because they are the main sources of space weather disturbances.

We have developed 3D global MHD simulation of the inner heliosphere. We use daily updated synoptic map of the photospheric magnetic field as a minimal input. As a first step, we calculate coronal magnetic field with potential field source surface model and obtain maps of open magnetic field and expansion factor. Applying empirical models (such as Wang-Sheeley-Arge model), we obtain solar wind synoptic map. Using time series of the solar wind maps as the inner boundary (25 solar radii), we perform the global MHD simulation in 2 AU. MHD parameters at the Earth position are passed to a radiation belt model (Miyoshi et al. 2004) for forecasting of radiation belt electron flux. These programs are executed everyday on a server in STEL, Nagoya University. We would like to report evaluation of our model comparing with in situ observations.

The solar wind as background for propagation of CMEs is prepared in this way. We also report a newly developed module to automatically detect flares and to inject associated CMEs, which contains magnetic flux ropes, into the inner boundary of the global MHD simulation. In addition, we introduce a method to explore an acceleration region of solar energetic particles associated with CMEs based on our model.