

Development of a real-time geospace simulator for space weather forecast

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Space weather forecast requires real-time numerical models along with various real-time observational data on the ground and in space. Real-time numerical models not only give present information on the space environment, but also predict upcoming space weather disturbances. Recently, a real-time global MHD model of the solar wind interaction with the earth's magnetosphere has been developed by National Institute of Information and Communications Technology (NICT) in collaboration with Kyushu University. The model is now operated at the NICT's space weather forecast center to understand present state of the magnetospheric environment and to predict magnetic disturbances.

However, the present real-time model has not satisfactorily included particle effects on the space environment and realistic ionosphere and thermosphere. High-energy particles could damage satellite instruments and human bodies in space, while ionospheric storms could affect various communication and broadcasting systems. Therefore, it is important to develop a numerical model which is able to predict such disturbances. We have started to improve our real-time magnetospheric model by including the particle effects as well as the ionosphere-thermosphere system. We will describe the current status and future prospect of the real-time geospace model.