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Forecast of ionospheric disturbances using a high-resolution atmosphere-ionosphere coupled model

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Space weather forecasts are about to enter a stage incorporating numerical forecasts based on realistic numerical simulation, in addition to conventional methods used by forecasters to make predictions based on observational data and experience. At the National Institute of Information and Communications Technology (NICT) of Japan, we have developed an atmosphere-ionosphere coupled model, which includes the whole neutral atmosphere and the ionosphere. The model is called GAIA (Ground-to-topside model of Atmosphere and Ionosphere for Aeronomy). The present version has spatial resolution of about 1 degree in horizontal direction. In addition, we are also developing a high-resolution regional ionospheric model, which has a horizontal resolution of about 10 km. We plan to combine GAIA and the regional model to reproduce mesoscale ionospheric phenomena, such as plasma bubbles and SED (storm enhanced density). The model will be a useful tool for space weather forecast. We will report previous results, and a plan for the new model.

Keywords: space weather, ionosphere, atmosphere, simulation, model, disturbance