

The ionospheric forecast system by assimilating GNSS observations

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An ionospheric forecast system is developed by the coupled thermosphere-ionosphere model (TIEGCM) and the GNSS observations (COSMIC density profile of radio occultation and ground-based GPS total electron content) through the data assimilation scheme (ensemble Kalman filter, EnKF). We further evaluate the forecast performance of the ionospheric data assimilation system during storm conditions. Two case studies are investigated by 26th September 2011 geomagnetic storm and 17th March 2015 St. Patrick's Day storm events. The root-mean-square differences (RMSD) between forecasted electron densities and observed electron densities are employed to evaluate the accuracy of ionospheric forecast during the entire storm period. Results show the forecast accuracy of ionospheric electron densities as well as the available forecasting time during the storm conditions can be further improved by using the high-latitude ion convection model (Weimer) with the parameters of high-resolution interplanetary magnetic field (IMF) and solar wind velocities and densities.