Ionospheric responses to the 21 August 2017 Solar Eclipse by using data assimilation approach

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Using the physical based thermosphere-ionosphere model with ensemble Kalman filter, this study reports the first data assimilation results of the ionosphere responses to the solar eclipse on 21 August 2017. The system with 2-minute assimilation cycle of ground-based GNSS observations show the dynamic variations of the equatorial ionization anomaly (EIA) due to modifications of the electrodynamics by the solar eclipse. Two major ionosphere responses are captured. First, there was an early appearance of EIA at the westward boundary of moon shadow, followed by the feature of the enhanced EIA at lower latitudes and the suppressed EIA at the higher latitudes. These eclipse-induced conjugate EIA variations are produced by the eastward electric field perturbation around magnetic equator and the westward electric field perturbation at the higher latitudes.

Keywords: ionospheric data assimilation model, electric field, solar eclipse-induced ionospheric responses

