

Assimilation of Radio Occultation data into NCAR/TIE-GCM model to study the influence of the interplanetary magnetic field on the ionosphere during the storm time

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We will construct a data assimilation model with the Thermosphere-Ionosphere Electrodynamics General Circulation Model (TIE-GCM) for the space weather in ionosphere during the magnetic storm time by assimilating the FORMOSAT-3 occultation total electron contents (OTEC). The TIE-GCM was developed by NCAR/HAO is a self-consistently electrodynamics coupled thermosphere and ionosphere model subjected by a few parameters with the lower and upper boundary conditions to describe the dynamics of the ionosphere and the thermosphere. The measured occultation total electron contents (OTEC) along the light path from GPS to LEO satellites could be assimilated with the TIE-GCM as a realistic model for the space weather in the ionosphere. We simulate the ionosphere in storm time in the day Sep. 09, 2011 with the assimilated data with 3 hours per cycle. During the geomagnetic storm time, we assimilated each three hours FORMOSAT-3 OTEC data with TIE-GCM to optimize the interplanetary magnetic field parameters used in the model that optimized the initial state of the model at the later time. Starting with the initial state at the initial time, we assimilate OTEC data forward one hour to the model to estimate the optimized interplanetary magnetic field parameters within this period. We make a three hours forward model run with the optimized parameters and the initial state to monitor the ionosphere. The results could be compared with the observation data in the ionosphere and the optimized interplanetary magnetic field parameters used in TIE-GCM will be compared with the values in the geophysical indices database (GPI).

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