AOGS 2005

A comparison between the observed TEC and the simulated results by using a theoretical thermosphere-ionosphere model: A case study of ionospheric data assimilation.

M. Q. CHEN[1], C. M. HUANG[1], Y. H. CHUL, and A. D. RICHMOND[2]

[1]*Institute of Space Science, National Central University, Taiwan, ROC.*
[2]*High Altitude Observatory, National Center for Atmospheric Research, USA.*

We represent ionospheric data assimilation for a thermosphere-ionosphere electrodynamics general circulation model (TIE-GCM) by using the slant TEC of GPS/MET radio occultation data. The NCAR/TIE-GCM global circulation model is a self-consistently electrodynamic-coupled thermosphere and ionosphere model subjected by a few parameters and boundary conditions to describe the dynamic thermosphere and ionosphere. The Global Positioning System (GPS) radio occultation signals received by a low earth orbit (LEO) satellite provide precisely measurement about the total electron content (TEC) along the signal paths to GPS satellites. We consider an optimal use of the GPS/MET occultation total electron content data to obtain the relative accuracy parameters used in TIE-GCM by minimizing the difference between the model results and measurements. These parameters used in TIE-GCM are solar flux, hemisphere power, cross-tail potential, diurnal and semidiurnal tidal modes at lower boundary. The cost function associated with 4DVAR is constructed as the function of the model parameters and then be minimized with respect to the parameters. We will examine a 4DVAR to the weather of the ionosphere from the simulated result of TIE-GCM in the day, February 23, 1997, and the result will be compared with the daily variation of the global TEC observed by the GPS network system.