Advanced assimilation of ground- and space-based observations for ionospheric specification

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Abstract

Early results from a new ionospheric data assimilation scheme are presented. The scheme is a development of the Multi-Instrument Data Analysis System (MIDAS), a variational approach from the University of Bath. The Thermosphere Ionosphere Electrodynamics General Circulation Model (TIE-GCM), developed by the National Center for Atmospheric Research (NCAR), is used as a background model. The new scheme provides improved analyses in data-sparse regions and will provide a forecast capability. The scheme is capable of assimilating slant Total Electron Content (TEC) observations derived from both ground-based and radio occultation dual-frequency Global Positioning System (GPS) measurements, as well as in-situ and ionosonde-derived electron density observations. Plans for developing the assimilation scheme into a forecast system are outlined. The system will assimilate ionospheric observations in near-real-time and use the TIE-GCM to produce forecasts of several hours.