

Validation of the Ionospheric Data Assimilation Three Dimensional (IDA3D) Algorithm

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Ionospheric tomography has been used for several years to create large-scale electron density maps for GPS or radio beacon TEC data. Recently, the computerized ionospheric tomography (CIT) algorithm [Bust et al., *Int. J. Imag. Syst. Technol.*, **5**, 160, 1994] has been adapted into the Ionospheric Data Assimilation Three Dimensional (IDA3D) algorithm. IDA3D is a data assimilation algorithm, which incorporates all available electron density and electron content observations into a coherent picture of the synoptic or global scale ionosphere. IDA3D primarily uses slant total electron content (TEC) measurements from available GPS ground sites and radio beacon receiver arrays operated by the Applied Research Laboratories, The University of Texas at Austin (ARL:UT), but can easily use peak electron density measurements from digasondes, electron density profiles from incoherent scatter radar and satellite-based GPS-occultation measurements of the topside TEC. This study compares different electron density maps for the same time period. Individual maps are created for each data set and combination of data sets (for a total of thirty maps), and compared to those observations that not used in a given map. By comparing the IDA3D maps to withheld observations, this study determines the validity of IDA3D, the usefulness of a given data set, and regions where more observations are needed.