

TOPSIDE ION DENSITY COMPARISONS AND ERROR DISTRIBUTIONS BETWEEN DMSP MEASUREMENTS AND IRI CALCULATIONS

B T Taylor<sup>1</sup>, T W Garner<sup>1</sup>, G S Bust<sup>1</sup>, M R Hairston<sup>2</sup>

<sup>1</sup>Center for Ionospheric Research, Applied Research Laboratories, University of Texas at Austin

<sup>2</sup>William B. Hanson Center for Space Sciences, University of Texas at Dallas

Abstract Submission Form  
2004 National Radio Science  
Meeting

Abstract: taylor1738

Date Received: September 24, 2004

The International Reference Ionosphere (IRI) is the most widely used empirical model of the ionosphere. Because transionospheric radio signals are modified by the topside ionosphere, the IRI estimates of the topside ionosphere need to be studied. This study compares the IRI-2000 topside climate with measurements from the SSIES instrument on board Defense Meteorological Satellite Program (DMSP) spacecraft. The SSIES instruments measure the bulk flow of the plasma, the electron density, the concentration of the  $O^+$ ,  $H^+$ , and  $He^+$  ions, and the temperatures of the electrons and ions every four seconds along the entire satellite orbit. Since 1995, eight different DMSP satellites flown in polar orbit at an altitude of  $\sim 840$  km with an orbital period of  $\sim 104$  min. Three spacecraft have orbits roughly aligned with the dawn-dusk line. The other five orbits are on roughly the 0930 – 2130 local time line. These data are available through the DMSP database (<http://cindispace.utdallas.edu/DMSP/>). After quality checking, this amounts to roughly tens of millions of data points. The IRI-2000 model is run to predict the ionospheric conditions at each DMSP measurement (roughly every 4 sec along each orbit), and the differences between the DMSP measurements and the IRI-2000 estimates are grouped as a function of magnetic latitude and solar activity. Since the IRI-2000 is a climate model, it is expected to produce Gaussian error distributions with a near-zero mean. This study concentrates on the electron density error distribution function. Occasionally, this distribution of errors is Gaussian. Unfortunately, some error distributions are non-Gaussian. The evidence suggests the shape of the error distribution function is dependent upon magnetic latitude, magnetic local time and solar conditions.

1. (a) Brandon Taylor  
Applied Research Laboratories  
University of Texas at Austin  
P. O. Box 8029  
Austin, TX  
78758 USA  
[taylor@arlut.utexas.edu](mailto:taylor@arlut.utexas.edu)
- (b) 512-835-3122
- (c)
2. G - Ionospheric Radio and Propagation
3. (a)
4. C - Contributed Paper
5. Poster