Comparison of TEC Derived Ultraviolet Limb Scans to TOPEX TEC Data

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In February of 1999, the Air Force Space Test Program launched the *Advanced Research and Global Observations Satellite* (*ARGOS*) into an 830 km altitude, near-polar sun-synchronous orbit with a 14:30 ascending node local time. On board the *ARGOS* satellite is a suite of remote-sensing instruments that measure density, composition, and temperature of both the thermosphere and ionosphere. The Low Resolution Airglow and Auroral Spectrograph (LORAAS) aboard ARGOS monitors upper atmospheric airglow in the far-ultraviolet and extreme-ultraviolet passband. LORAAS is identical to the Special Sensor UV Limb Imager (SSULI) instrument whose mission will be starting with the launch of the next Defense Meteorological Satellite Program (DMSP) satellite and continuing on the next four DMSP satellites. Limb scans, atmospheric radiance profiles, in the satellite's orbital plane are collected every ninety seconds. At night, the altitude distribution of the OI 1356 Å emission can be used to determine variations in the vertical electron density distribution.

The study presented here is a continuation of previous research into the comparison of total electron content (TEC) derived from LORAAS UV limb sensing techniques to total electron content derived from TOPEX data of the nightside ionosphere used to assess the accuracy of the UV inversion. It is necessary for a validation effort to be performed to estimate the quality of the two-dimensional nightside ionosphere algorithm based using the LORAAS data set. An earlier comparison using data from November 1999 and December 2000 showed promise for this research endeavor. Although there was a small sampling for 1999, all indications are that there is very good agreement with regard to TOPEX TEC and the LORAAS UV TEC measurements. This would indicate that our algorithm is working properly and that the sensitivity coefficient derived from the previous stellar calibration is correct. Upon first glance at the 2000 data, it was noted that there seemed to be a bias in the LORAAS UV data. A simple recalculation showed that the sensitivity coefficient needed to be updated for this time period, and was calculated based on the TOPEX results to range between 0.14 and 0.20.

With the continuation of this work here, our objectives include the inclusion of additional valid scans, a reduction in regularization in an attempt to better capture the Ionospheric variations in the UV reconstruction, and an analysis of data from December 2001 to increase our sample. Another priority is to evaluate the decrease in instrument sensitivity as a function of time. By doing this the threshold signal to noise value can be determined, allowing for quantification of the errors associated with the density retrieval.