UV Data Products Derived From Low Earth Orbit Hyperspectral Imagers - Characterizing Space Weather

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The UV instruments on TIMED/GUVI and DMSP/SSUSI were designed to scan both sequentially, global images are accumulated. These images result from UV light emitted by atoms in the thermosphere, and the intensity can be used to derive a wealth of products that characterize the ionosphere and aurora. The UV derived products provide an accurate near real-time monitoring of the local space weather environment.

INSTRUMENT OPERATION

The UV instruments on TIMED/GUVI and DMSP/SSUSI were designed to scan both the Earth’s disk and limb.

UV Hyperspectral Imager Instruments

UV instruments supplied by APL are hyperspectral scanning imagers. By scanning the Earth sequentially, global images are accumulated. These images result from UV light emitted by atoms in the thermosphere, and the intensity can be used to derive a wealth of products that characterize the ionosphere and aurora. The UV derived products provide an accurate near real-time monitoring of the local space weather environment.

3-D Ionospheric Electron Densities and HF Propagation

HF propagation through the smooth global models like IRI can leave users expecting simple behavior. Ionospheric models such as IRI (Illustrated above) show a relatively smooth and simple ionosphere.

The actual ionosphere, reconstructed from SSUSI high resolution measurements show a much richer structure full of irregularities that will affect GPS and radio signals.

Using a more realistic ionosphere as observed by an UV instrument shows much more complex behavior.

UV Product Visualization

New dynamic visualization products are created to facilitate easy monitoring of the ionosphere and aurora zones. These UV derived products are shown layered over the SSUSI LBH short radiances. Google Earth visualizations made from associated SSUSI products contain information in multiple layers.

SSUSI Gridted Radiances are rendered in Google Earth as multilayered RGB Radiances. They are binned and then rendered separately for the disk and limb data.

High Resolution Images of the SSUSI Radiances are made daily by combining UV images in RGB as blue (359 A), green (135 A) and red (677 A) images. Note that the radiances images from the South Atlantic Anomaly is subtracted from 135 and 359 A, but not the 677 A image.

UV Product Summary

The complete list of products derived from APL’s UV hyperspectral imagers follows. Note there are depliable products on the list that are now undergoing validation and we hope to have validated depliable products soon.

UV Data Product Summary

http://guvi.jhuapl.edu

APL is currently in discussion with NOAA about making SSUSI products available through the National Geophysical Data Center.