http://guvi.jhuapl.edu/image_on2/

Background

Method

Thermospheric O/N_2 ratio is defined as the O and N_2 column density ratio referenced at N_2 column density of 10^{17} cm^{-2}. The O/N_2 maps in this web site is derived from IMAGE SI-13 [Mende et al., 2000] day-glow data. These O/N_2 maps are obtained for major magnetic storms (Dst index < -80 nT) between 2000 and 2005 and when IMAGE SI-13 was taking measurements of emissions from the sunlit thermosphere.

IMAGE SI-13 day-glow intensities are contributed by 135.6 nm emission from atomic oxygen and LBH band from N_2 molecules. During magnetic storms, O density changes (often decrease) and N_2 density increases slightly. This leads to O/N_2 decrease. To estimate the storm time O/N_2, the relative difference in solar EUV flux corrected SI-13 intensities during magnetic storms and quiet time just before the storms are obtained first. By assuming the quiet time O/N_2 ratio, the relative differences in SI-13 intensities are converted to O/N_2 with a pre-calculated table using AURIC [Strickland et al., 1995]. Details are described in [Zhang et al., 2004].

Known caveats:

(1) O/N_2 values are available only for dayside with solar zenith angle less than 90 degrees.

(2) Auroral emissions are not removed. The O/N_2 in auroral oval should not be used. The original SI-13 images are also provided in this web site to identify auroral regions.

(3) SI-13 flat field algorithm is provided by the IMAGE FUV team. But it may not work well all the time. This impacts the O/N_2 products.

(4) Pointing of SI-13 still subjects to some errors even after attitude correction is done.

(5) A fixed O/N_2 value (assumed) for quiet times may ignore the effects of season and solar EUV flux.

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