**VARIATIONS OF THE TITAN AIRGLOW WITH THE SOLAR ZENITH ANGLE.** E. M. Royer[1] , J. M. Ajello[1], R. A. West[2], T. E. Bradley[3], G. Holsclaw[1] and L. W. Esposito[1], [1]University of Colorado (3665 Discovery Drive, Boulder, CO 80303, Emilie.royer@lasp.colorado.edu), [2]JPL, Pasadena, CA, [3]University of Central Florida, Orlando, FL.

**Introduction:** Solar XUV photons and magnetospheric particules are the two main sources contributing to the airglow in the Titan's upper atmosphere [1],[2],[3],[4]. In this paper, we focus on the solar XUV photons and how they influence the airglow intensity.

**Observations:** We used Cassini-UVIS observations from different years but with similar geometry, as shown in figure 1. Each observation consists in a partial scan of Titan, while the center of the detector stays approximatively at the same location on Titan's disk. We used observations from 2008 to 2012, which allow for a wide range of Solar Zenith Angle (SZA).

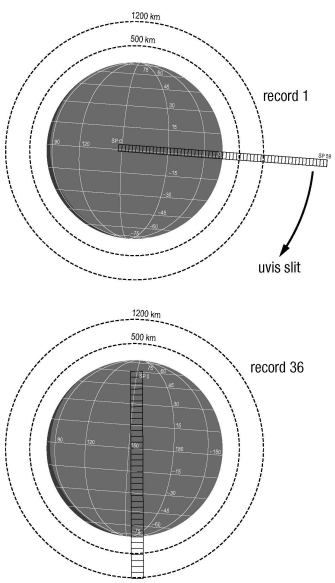


Figure 1: Geometry of the observations used in this study. The slit of the UVIS detector is shown at the record 1 and record 36, respectively at the beginning and the end of the sequence of observation.

Spectra have been corrected from the solar spectrum using TIMED/SEE data obtained at the same day of observation. Each value is then normalized to 1. We are looking at altitudes from 800 to 1200 km.

**Results:** Figure 2 demonstrates that the airglow intensity varies as a function of the SZA and follows a Chapman curve.

We can define three SZA regions: the sunlit region ranging from 0 to 50º. In this region, the intensity of the airglow increases, while the SZA decreases. Nevertheless, other wavelengths exhibits a more steady intensity in this region. Between SZA 50 and 100º, the airglow intensity decreases from it maximum to its minimum. In this transition region the upper atmosphere of Titan changes from being totally sunlit to being in the shadow of the moon. For SZA 100 to 180º, we observe a constant airglow intensity close to zero.

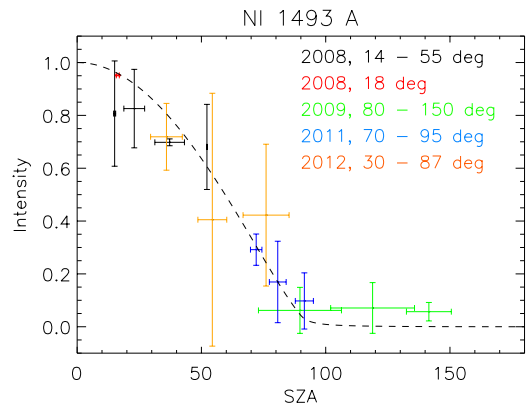


**Figure 2:** evolution of the intensity of the atmomic NI emission at 1493Å with the SZA. The dash line represents a Chapman curve.

The behavior of the airglow is also similar to the behavior of the electron density as a function of the SZA [5]. Both variables exhibit a decrease with the SZA. The goal of this paper is to understand such correlation.

This work shows the importance of the solar XUV photons contribution to the Titan airglow and proves that the strongest contribution to the Titan dayglow occurs by solar fluorescence rather than the particle impact that predominates at night.

**References:** [1] Ajello et al. (2007) *GRL, 34*. [2] Ajello et al. (2008) *GRL*. [3] Ajello et al. (2007) *GRL, 117*. [4] West et al. (2012) *GRL*, 39. [5] Ågren K. et al. (2009) *Planetary and Space Science, 57,* 1821–1827.