Moon light influence to UV light measurements

Dependency of UV light intensity on moon phase (M_p, 0 = new moon) and moon zenith angle (M_{ZA}) is presented on the next figures.

At Figure 1. are UV light intensities measured by Tatiana satellite as function of M_{ZA} and M_p for measurements when sun zenith angle S_{ZA} was higher than 135°. Let us note that (red) spots with high intensities in region M_{ZA}>90° are probably created by flashes/TLE events – we will confirm/refuse this hypothesis by using some 'flash filters' to data in the next weeks.

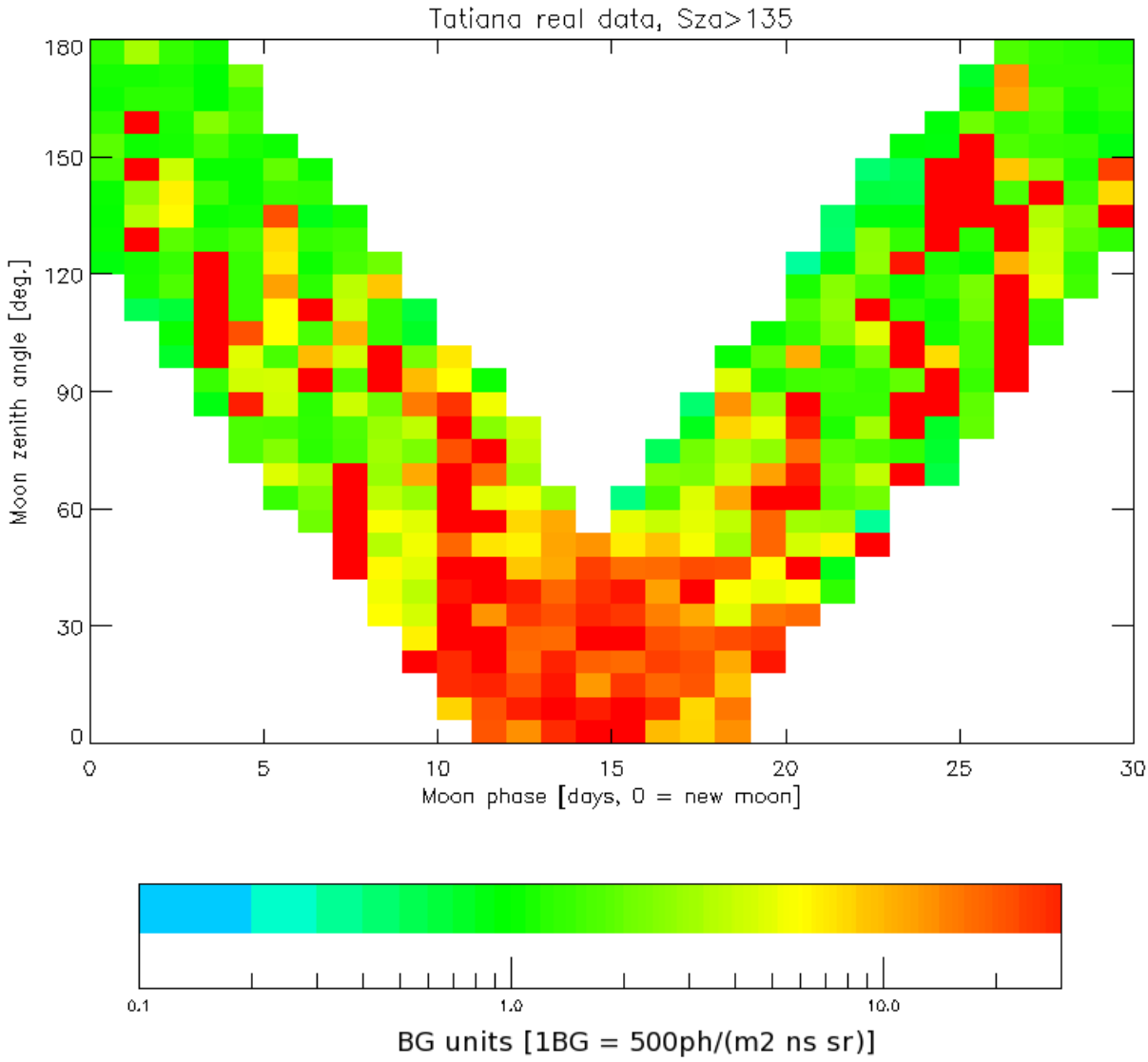

Figure 1. Real Tatiana data. UV light intensity dependency on M_{ZA} and M_p for S_{ZA} > 135°

Distribution of Tatiana measurements as function of M_{ZA} and M_p for S_{ZA} > 135° we can see on the figure 2. (used grid - 1 day M_p x 6 degree in M_{ZA} cell).

To see only moon light influence in Tatiana measurements we take a Tatiana real data orbit positions for S_{ZA} > 135° and simulate for them a moon ligh. Intensity of moon light I_{UV} was estimated by formula [1][2]:

$$I_{UV} = 16000 * \cos(M_{ZA}) * 10^{-0.4*(0.16 M_p + 5.5*1e\text{-}6*M_p^4)} \quad (1)$$

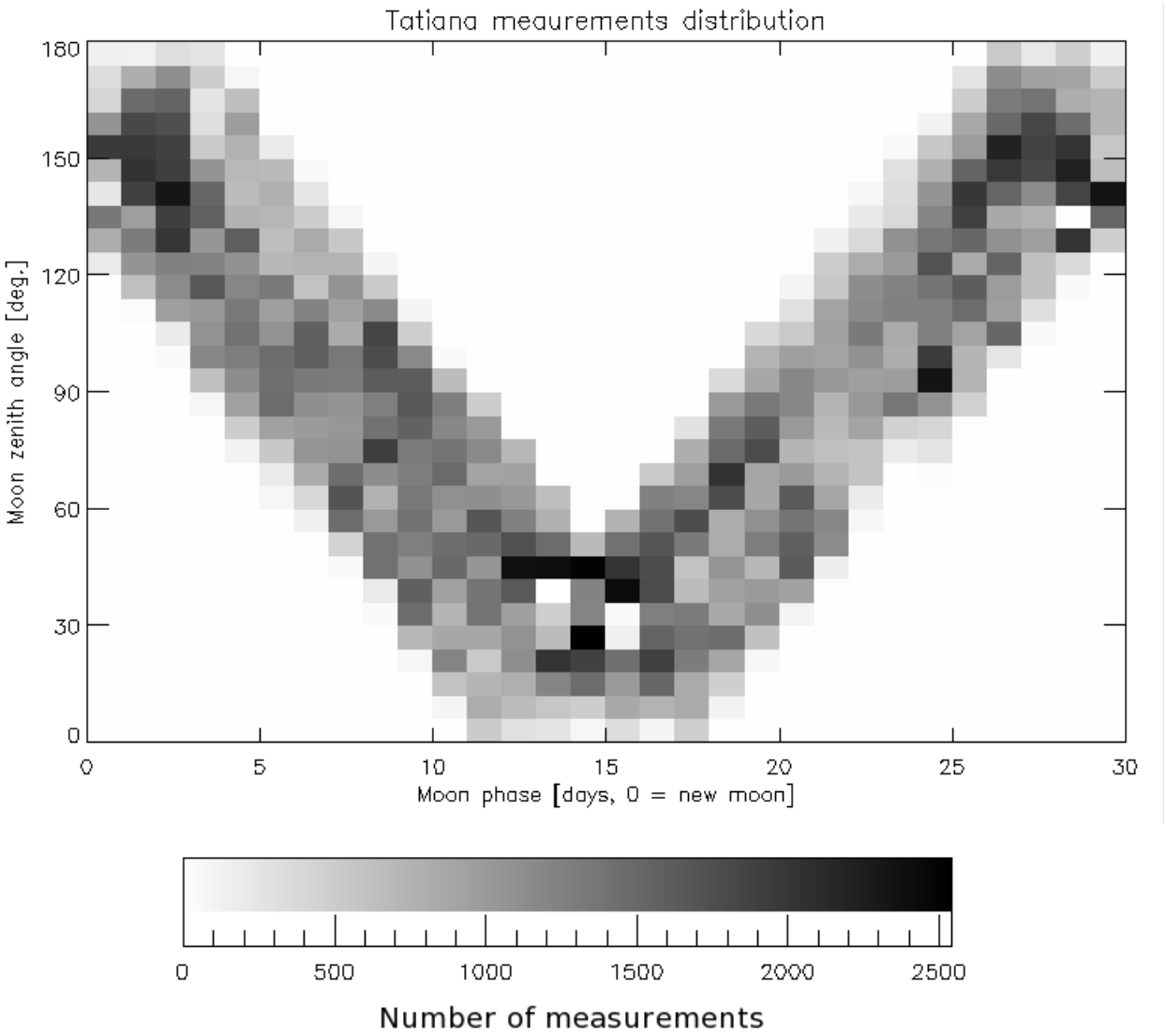

Figure 2.

At figure 3. we can see result of Tatiana real orbit positions and UV light intensity estimation by (1) combination. Figure 3. is simillar to figure 1. in region where $M_{ZA}>90^{o}$ i.e. when moon is visible expcept red spots which are (hypothesis in previous text) flashes or TLE events.

Same method as we use to create figure 3. with Tatiana real orbit and UV light evaluated by (1) we apply to real ISS trajectory. We use real ISS trajectory [3] and (1) for positions where $S_{ZA} > 112.5^{o}$. Result is presented at figure 4.

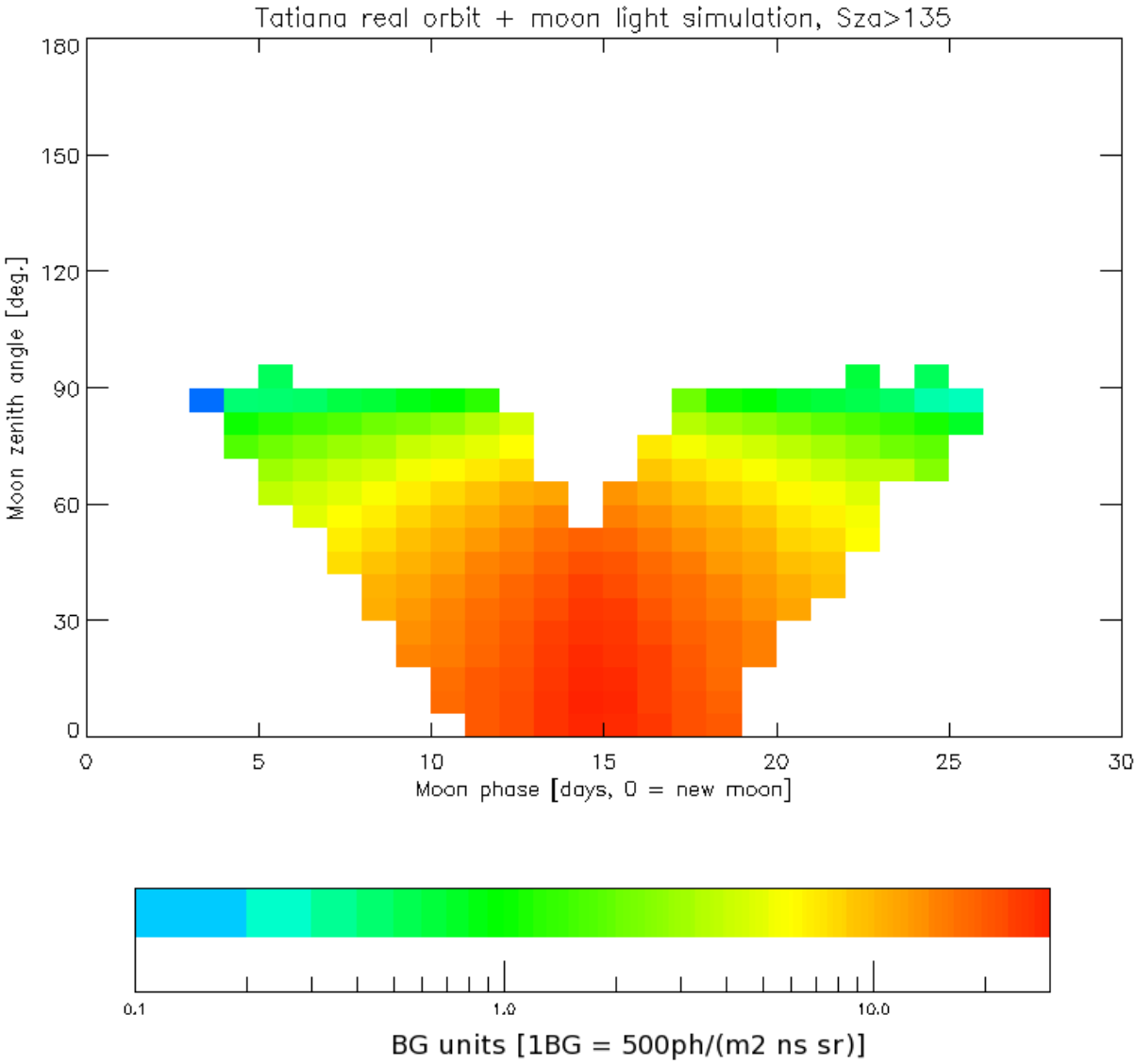
Tatiana real orbit + moon light simulation, Sza>135
Moon zenith angle [deg.]
180
150
120
90
60
30
0
0
5
10
15
20
25
30
Moon phase [days, 0 = new moon]
0.1
1.0
10.0
BG units [1BG = 500ph/(m2 ns sr)]

Figure 3.

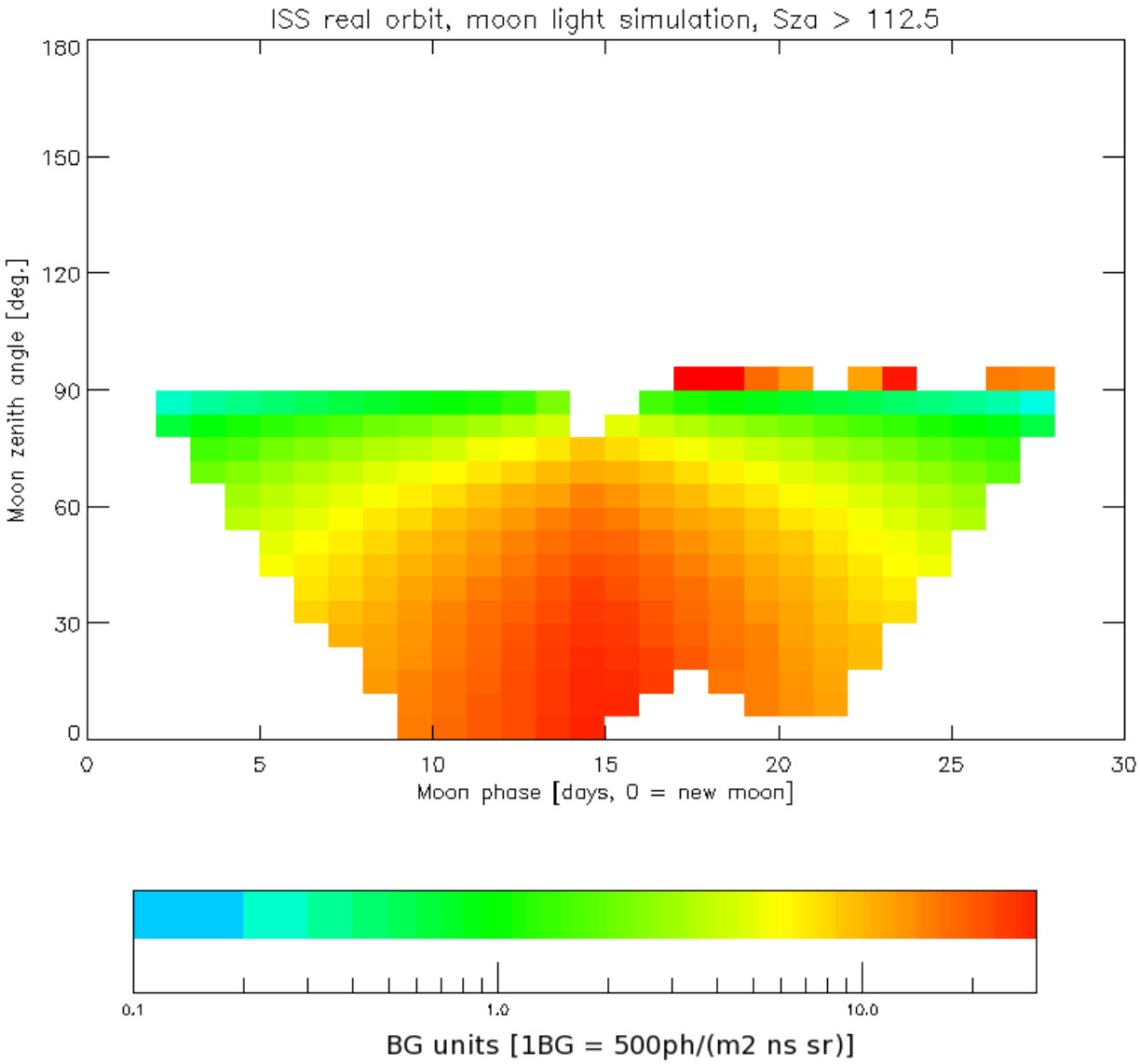

Figure 4.

Citations

1. Montanet: EUSO-SIM-REP-009-1.2 (2004);
2. Krisiunas & Schaefer, Astrom. Soc. of the Pactifc, 103, (1993) 1033. Krisciunas
3. http://sscweb.gsfc.nasa.gov/cgi-bin/sscweb/Locator.cgi