

Detection Rate of Lunar Impact Flashes

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Some tens of optical flashes on the night side of the Moon have been observed since 1999 [1-6]. Most of them happened during the Leonid and Perseid meteor shower activities and are attributed to the high velocity impacts of meteors. In this work, we estimated the number of such flashes (lunar impact flashes) of magnitude 9 or brighter observed from the ground per hour. We estimated the detection rate for meteoric streams and for sporadic meteoroids, separately.

For meteoric streams, we assumed that the meteoroid flux would correspond to ZHR (Zenithal Hourly Rate) = 100, that is, 100 meteors of magnitude 6.5 or brighter would be observed per hour on the ground. Meteoric population index that was related to the slope of the power-law size distribution of meteoroids was assumed to be 2 - 3. Optical energy is assumed to be 0.2%, 0.6% of impact energy, or some function of impact velocity. Results show that more than ten flashes would be observed per hour. It is interesting to note that the number increases with decreasing velocity of meteoric streams (relative to Earth-Moon system).

For sporadic meteoroids, we assumed a flux and a particle size distribution. Optical efficiency is modeled as for the meteoric streams. The detection rate depends on the optical efficiency. Results show that a flash of magnitude 9 or brighter would be observed per 3 - 30 hours.

References

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