

Jovian Impact Flashes and its Implication to the Small Bodies.

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Optical flashes on the surface of Jupiter were observed by amateur astronomers in June and August 2010. Four amateur astronomers in Japan recorded a flash at 3h22m12s on August 21 (UT). The coordinate is 140.4 and +21.1 degrees in system II. The duration was about two seconds, and the brightness was 6.2 magnitudes[1]. The preliminary light curve is shown in the figure. This data is presumed to be an equivalent or slightly smaller scale than that in June[2].

It is thought that these phenomena were bright meteors caused by the collision of small celestial bodies of a few to 10 m, and that they seemed to be more frequent than expected. If the frequency and the scale of these phenomena are investigated, the size distribution down to size of a few m can be estimated at around the giant planet region.

In case of Earth, the brightness of meteors depends not only on sizes but also on the entry velocity. However, in the case of Jupiter, the entry velocity becomes almost similar value (60-64km per second) which is almost independent on the direction of the orbits of bodies because of the strong gravity of Jupiter. We do not have any uncertainty for estimating size of impacting bodies from the brightness of the flashes.

On the other hand, we have large uncertainty in the size distribution of small bodies in the giant planet region[3], because we cannot see directly any bodies of less than 1 km. Therefore, if the systematic observation is achieved, it will be a unique attempt to use the giant planets as a natural detector of small bodies, and to derive size distribution of small bodies in the giant planet region.

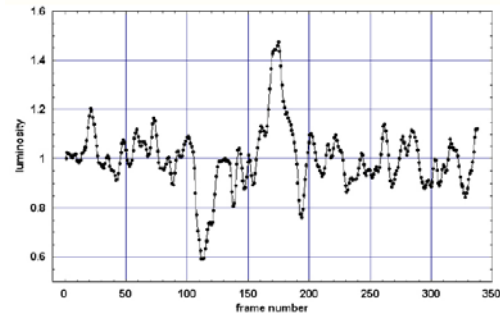


Figure 1. Preliminary light curve of the optical flash recorded on August 21 by Mr. M. Tachikawa

References:

- [1] Watanabe J. et al. (2010) *Abstract in JGU meeting 2011*, P-PS22.
- [2] Hueso R. et al. (2010) *Astrophys. J.*, 721, L129.
- [3] Zahnle K. et al.(2003) *Icarus*, 163, 263.