

The First detection of Perseids Lunar Impact Flash and Meteoroid Distribution of 1 rev-Dust Trail of 109P/Swift-Tuttle

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A lunar flash was observed at 18h28m27s on August 11, 2004 (UT) from a few sites in Japan. Its brightness was about 9th in magnitude and its duration was about 1/30 second. Its location was 48N and 76E in selenographic latitude and longitude. The flash is clearly seen in video frames recorded at three sites. Its time in the three records agrees within 0.2 second, and its position agrees within about 0.1 arc-minute. The flash coincides with the encounter of the moon with the 1862 dust trail of Perseids meteoritic stream. The flash must therefore be caused by a Perseid impact. This is the first detection of non-Leonids Lunar Impact Flash.

The magnitude of the flash was calculated by comparing its brightness with that of some stars. It is 9.5 ± 0.3 in magnitude for the observations by Takamura et al., Ida & Adachi, and Ishida. This is the dimmest impact flash ever observed and confirmed. The meteoroid mass that caused the flash is estimated to be a few tens of gram, assuming that 2×10^{-3} of the kinetic energy of the Perseid is transferred to visible light energy.

The flux of cm size Perseid meteoroid is 2×10^{-2} per $(1000\text{km})^3$ at the moon.

Here assuming that the mass index $s=2$, HR is about $10^6 / 10^5 \text{ km}^2$ on the moon. On the other hand, at the close approach time of the Earth, ZHR is about 200 (IMO report 2004). From these, we can confine the dust distribution model within the dust trail.

Lunar Impact Flash Observation network:

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