

Reentry physics and upper atmospheric sciences derived from artificial meteors

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A meteoroid or reentry object interaction with the atmosphere described as a meteor phenomenon is a complex physics depending on many variables such as entry velocity, entry angle, composition, shape, density, atmospheric conditions and so on. Artificial meteors are the best-known way to test and calibrate theoretical models of meteoroid ablation, and has capabilities to investigate upper atmospheric conditions. In 1960s, the first artificial meteor experiments were accomplished by using sounding rockets with entry velocities from 8 to 16 km/s, which provided very important luminous efficiencies parameters. In 2019, Astro Live Experiences (ALE Co., Ltd.), Tokyo-based startup company, has developed a small-satellite "ALE-1" which was successfully launched by JAXA's Epsilon-4 rocket in January. The ALE-1 started descending the orbit altitude from 500 to 400 km until below the International Space Station using DOM (De-Orbit Mechanism), and "a whole new level of entertainment" through the Sky Canvas project will be held in Spring 2020 over Hiroshima area. We will discuss reentry physics and upper atmospheric sciences which can be derived from ground-based observations of controlled artificial shooting stars.