

## Meteoroid-atmosphere interaction processes: fragmentation

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One of the long-term questions in meteor physics is how big role fragmentation plays in the meteoroid-atmosphere interaction processes. It is observationally quite easy to confirm if a large meteoroid, producing a bright fireball, fragments into pieces. Small radar meteoroids pose a greater challenge. Regular pulsations in received power of meteor head echoes have, however, been shown to be a signature of interference from multiple fragments (Kero et al. GRL 35 L04101, 2008). This opens up the possibility to examine the properties of fragmentation events by their signature in radar data. We present preliminary results from simultaneous observations of meteor head echoes with the 46.5 MHz Middle and Upper atmosphere (MU) radar in Shigaraki and a collocated ICCD imager.

The radar targets of meteor head echoes have the same motion as the meteoroids on their atmospheric flight and are relatively independent of aspect angle (Kero et al. GRL 35 L07101, 2008). They appear to be compact regions of plasma created at around 100 km altitude and have no appreciable duration. Simultaneous radar and optical observations of meteors are necessary to clarify the relation between luminous efficiency and ionization. Fragmentation is taking place on a too small scale for individual fragments to be observable optically, but the effect of fragmentation on the optically observed luminosity can still be examined with help of its signature in the radar data. As the orbits of the meteoroids can be calculated, we will investigate if meteoroids from different populations show signs of different physical characteristics. Meteoroids can generally be associated with short-period and long-period comets or asteroidal and (possibly) interstellar origin depending on their orbits (Szasz et al. MNRAS 388, 2008). The statistical study of fragmentation may provide information about physical differences between different meteoroid populations as well as a better understanding of the fate of meteoric material in the atmosphere. Meteoric dust serves as condensation nuclei in the mesosphere and is important in high altitude cloud formation processes and atmospheric dynamics. The altitude profile and size distribution of the deposited meteoric dust depend on the mass flux input as well as the atmospheric interaction processes.