

**PDC2017
Tokyo, Japan**

IAA-PDC-17-03-15

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**SIZE AND ORBITAL DISTRIBUTION OF INTERPLANETARY DUSTS
ASSOCIATED WITH NEAR-EARTH ASTEROIDS BY MU RADAR METEOR HEAD
ECHO OBSERVATION**

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Keywords: *meteoroids, asteroids, comets, radar*

ABSTRACT

Solar system small bodies ranging between 10^{-15} and 10^{15} g are continuously colliding with the Earth. Majority of them are so called meteoroids or IDPs (Interplanetary Dust Particles) whose diameters are estimated between 10 and several 100 μm . It is indicated by ground-based optical and radar observations or in-situ measurements that a daily mass influx of meteoroids is ranging from 100 to 300 tones. However, it is still a matter of determining size distributions of influx meteoroids and finding parent bodies of them, while parent bodies of major meteor showers have been identified as comets or dormant comets. Their physical and chemical aspects such as orbits, composition and structure are also poorly known.

The influx rate of interplanetary dusts onto the Earth's surface is essential for the human space activities. Thus, it is also very important to investigate influx rate, orbits and mechanical strength of meteoroids.

High power large aperture (HPLA) radar observations have enabled to provide information on individual meteoroids' orbits, their influx and ablation processes in the upper atmosphere. The meteor head echo observation has been carried out using the middle and upper atmosphere radar (MU radar) of Kyoto University at Shigaraki (34.9N, 136.1S), which is large atmospheric VHF radar with 46.5 MHz frequency, 1 MW output transmission power and 8330 m² aperture array antenna. We have revolutionary achieved to determine the most precise orbits of approximately 180,000 meteoroids observed between 2009 and 2016. In order to investigate the size distribution of these meteoroids, simultaneous observations using MU radar and high-sensitive optical observations, about 9th limiting magnitude, were achieved to obtain the relationship between Radar Cross Section (RCS) and visual magnitude that can provide the size of meteoroids.

This paper describes physical quantities of radar meteoroids such as orbital parameters, flux rate, ablation characteristics and size distributions obtained from the MU radar meteor head echo observations. Associations between meteoroids and possible break-up near-Earth asteroids such as "Icarus asteroid family" and "Phaethon-Geminid stream complex" observed by MU radar will be discussed.
