

Observations of the sporadic meteoroid influx with the 45.6 MHz Shigaraki MU radar

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We have used the interferometric 46.5 MHz Shigaraki MU radar located at 34.85°N 136.10°E in Shigaraki, Japan, to determine very precise geocentric velocities of sporadic meteoroids from meteor head echoes. The echoes were detected in the height range of 73-127 km. Head echoes are radio wave reflections from the ionized plasma around the meteoroids generated by the interaction of meteoroids with the atmosphere at about 70-140 km altitude. Sporadic meteoroids are the ones which cannot be associated to a certain meteor shower and they are known to have orbits of all inclinations.

The interferometric ability of the MU radar has proven to give precise geocentric velocities and directions of the observed meteoroids, within a few tens of metres per seconds and a fraction of a degree, respectively. The high power, large aperture and low frequency of the MU radar enable a large number of meteor head echo observations, including from small and slow meteoroids. We observe thousands of meteors per 24 h observation, meteors for which we can determine velocity and direction accurately. We present here preliminary results from data sets collected during a 6 h run and two 24 h runs this year, March 30-31, June 27-28 and July 28-29, respectively. We will present geocentric velocities, sizes, orbital elements of the observed meteoroids and meteor source distributions of the detected meteors. The high count rate allows us to do hourly statistics of the estimated results.

The earth is bombarded daily with about 100 ton extraterrestrial material, most of the meteoroids being sub-millimetre sized. However, the real number of the influx is not known. Therefore, regular observations of the meteoroid complex would be very valuable. Previous investigations we have conducted with other instruments suggest that the influx varies with season. The MU radar is a very capable instrument for providing further information about this. A careful investigation of the seasonal variation by observing the sporadic meteoroid complex along the earth orbit at different times of year may give clues to its origin - the sources of the present solar system dust and meteoroid population.