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Orbital structure of the meteor complex according to radar observations in Kazan. 1. Apparent distributions of aphelia

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Abstract

The results of an analysis of the orbital structure of the meteor complex accessible for radar observations at northern midlatitudes are reported. Experimentally, the study is based on the long-term monitoring of the influx of meteor matter into the Earth's atmosphere performed with the meteor radar of Kazan State University starting from 1986. The study uses a discrete quasi-tomographic method to measure the radiant and velocities of meteor showers based on goniometric data of the meteor radar and diffraction measurements of meteor velocities. The discretization of the detection environment-in particular, in terms of velocity-is shown to result in no substantial loss of measurement accuracy. The error of the measured velocity of the shower does not exceed 1.5 km/s for a standard deviation of a single velocity measurement equal to 3 km/s. Microshower representation is used with microshowers either representing the correlated part of the sporadic complex or being partial streams of major and minor showers, or fragments of the dust environment of minor bodies passing by Earth or falling onto it. The data of measurements made over the entire annual cycle are used to construct combined maps of the distribution of the observed 2263 microshowers (a total of 22 604 orbits) by their inclination, aphelion distance, and longitudes of the ascending nodes of their orbits. The observing conditions are shown to have a significant effect on the parameters of the distribution of aphelion distances for different months, and the corresponding distributions for prograde and retrograde orbits are shown to differ fundamentally. A specific feature of such distribution maps is that they allow uniform representation of both meteor showers and irregularities of the sporadic complex. © 2008 MAIK Nauka.

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