DETERMINATION OF THE METEOR PARTICLES PROPERTIES FROM OBSERVATIONAL DATA.

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Introduction: Meteoroids hold the information about the structure and composition of matter in the initial stages of the development of the Solar system. Large part of meteor particles do not reach the Earth's surface, and their properties should be determined indirectly based on observational data. The energy deposition due to interaction of the meteor particle with the Earth's atmosphere determines the light and ionization, which are observed by different techniques. The energy deposition depends on ablation rate and deceleration of the meteor particle. The ablation and deceleration are determined by the particle size and density , as well as the angle and speed of entry into the atmosphere. To determine the properties of the meteor particles different models should be applied to observational data (Fig. 1). Properties of meteor particles is important for study of different problems, including the small bodies distribution in the Solar system, the origin and evolution of the meteoroid streams, the risk assessment for space exploration etc.

The accuracy of meteor particles mass determination is low. Meteor mass estimates, suggested by different authors, vary by orders of magnitude [1].

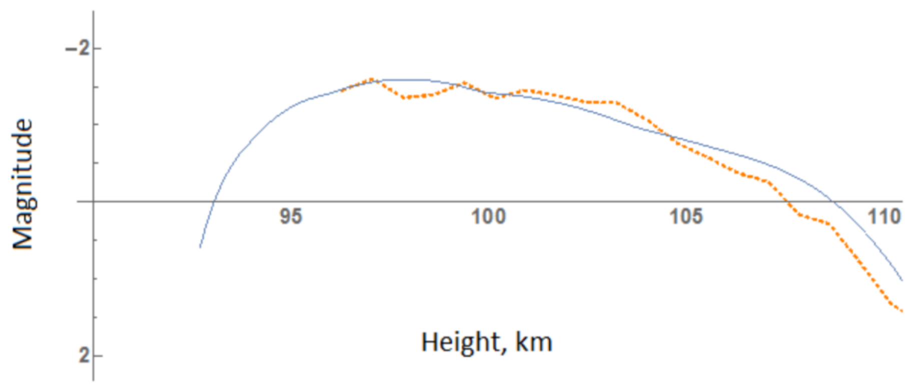

Figure 1. An example of **c**omparison of observed (orange) and modelled (blue) light curves.

Descriptions of models: Light curves are usually reproduced wth the help of two most common ablation models [2]. The first model assumes that the entire incoming energy flux is consumed for ablation. The second model suggests that the incoming energy is expended on heating, radiation and ablation of the meteor. The mass loss itself is determined by the saturated vapor pressure. Parameters that determine the loss of mass: ablation heat and dependence for saturated vapor pressure.

The coeffiients, included in model equations, i.e. drag, heat transfer coefficient and luminous efficiency, are determined under different assumptions about realized flow regime.

Model coefficients, used by different authors, essentially vary that introduces uncertainty into the model solution and obtained meteoroid properties. The luminous efficiency is often assumed to be constant in the range of 0.7% to 5%. In fact, the luminous efficiency may depend on the substance of the meteoroid, the meteoroid velocity and the altitude of flight. The same is valid for the heat transfer coefficient. In addition, a large uncertainty is introduced by calculation of the mass loss through saturated vapor pressure.The saturated vapor pressure is determined through a dependence, which can be found experimentally or modelled. The scatter in used pressure values at the same temperature reaches orders of magnitude.

Discussion: Light and deceleration of a number of meteor events were reproduced. The solutions were found by Monte Carlo procedure. Corresponding meteor particles parameters were determined, and model coefficients were estimated. The presentation will discuss used models, their uncertainty and obtained results.

References: [1] Campbell-Brown M. et al. (2012) *J.Geophysical Research* 117: CiteID A09323;[2] Kartashova A.P. et al., 2017 *Proceedings of Triggernye effects conference*: 483-489. [3] Popova O. (2005) *Earth, Moon and Planets* **95**: 303-319.