SMALL METEORIC BODIES: COMPARISON OF THE POROUS BODY MODEL AND THE SOLID BODY MODEL

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Meteor bodies, along with asteroids and comets, carry important information about our Solar system. Most meteoroid bodies do not reach the Earth's surface, so their properties have to be determined by circumstantial evidence. Despite the long history of studying meteoroid phenomena, the problem of accurately determining the mass, density and other properties of meteoroid material from observational data remains to be solved.

A series of observing campaigns were carried out during Perseids activity in the period 2010- and 2016 from southern Greece. To estimate the parameters of these meteoroid bodies (mass, density, etc.) an ablation model was used, in which the energy of the incoming stream is spent on radiation, heating and mass loss of the meteoroid. The meteoroid body was considered in two modifications: as a solid body and as a porous body. The deceleration of the porous body is considered as the deceleration of a single spherical object, whereas evaporation occurs from the mineral grains that form the meteoroid. An automated method has been developed to estimate the parameters of small meteor bodies, and the effects of the residual function and the uncertainty in the dependence of the saturated vapour pressure on the results have been analysed. It has been shown that the mass and size estimates are weakly affected by the choice of the residual function. The assumed dependence of the saturated vapour pressure has little effect on the mass estimate; a more pronounced effect occurs for the radius estimate. The porous body model slightly changes mass estimates, but does affect size and density estimates (increases by up to a factor of two). Meteoroid densities within our model are determined with great uncertainty for the same meteor, using different residual functions and vapour pressures. Comparison of our density estimates with data for cometary matter shows that they fall within the range of known comet densities.