Using High-Resolution Observations to Constrain the Grain Mass Distribution of Small Meteoroids

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Aims. Here the ablation of several meteor events is simulated using the Thermal Disruption Model, and modeling data acquired from the Canadian Automated Meteor Observatory (CAMO). CAMO has two wide-field cameras, which can measure meteor light curves and deceleration curves, and two narrow-field cameras which image meteor wakes at high resolution. The purpose is to determine whether the high-resolution wake provides enough data to constrain the grain mass distribution of small meteoroids (1x10^-7 – 1x10^-4 kg). The narrow-field CAMO observations may provide a strong constraint for this ablation model compared to light curves and deceleration alone, as the model can now be required to fit both the wide- and narrow-field data.

Methods. A number of Gaussian grain size distributions were used to simulate the ablation of several meteor events, where the average grain masses range from 1x10^-12 – 1x10^-5 kg, and the meteoroid is assumed to consist of 3, 6, or 9 different grain masses. The entire phase space of the model parameters is explored for this event to find light curves that provide a good fit to the observations; a good fit is based on a reduced chi-squared value of the observations versus the model that is less than 1. The resulting parameters are used to model the wake of the same event, which are compared to CAMO's narrow-field observed wake.

Results. Results of initial modeling events will be presented, and the ability of the measured wake to constrain the grain mass distribution of small meteoroids will be assessed.