

Can the Leonid Meteors tell us if Comets have Chondrules and CAIs?

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Studies of the Leonid meteor showers over the past few years have yielded a wealth of results relevant to the structure and composition of cometary solids. One of our goals is to test the existence of chondrules and Ca-Al-rich inclusions (CAIs) in comets based on meteor observations. Chondrule-sized objects would be too faint to study in most meteor showers, but the high velocity (~ 72 km/sec) of the Leonids (comet Tempel-Tuttle) make these small objects produce meteors the range of $V_{\text{mag}} +3$ or $+4$. There is little consensus about the formation mechanisms for chondrules and CAIs, and one prominent model, the "X-wind" model (e.g., Shu et al. *ApJ*.548.1029, 2001), explicitly predicts that chondrules and CAIs will be present in comets. Hence, observational constraints on the presence or absence of chondrules and CAIs in comet Tempel-Tuttle are likely to contribute to a better understanding of their formation process.