

Understanding the Kreutz sungrazing comets

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We present the results of our study of the Kreutz family comets observed by SOHO-LASCO. This is a continuation of earlier work by Biesecker et al. (2002) and includes all Kreutz comets which reached perihelion in the SOHO-LASCO field of view by the end of 2005, a sample of over 900 comets. We use physical models of the nucleus such as composition, density, porosity, and production rates to explain the characteristic features of Kreutz light curves, notably the slope of brightening, the peak in brightness at 10-13 solar radii (prior to perihelion), and the rapid fading interior to this. The possibility that there exists two distinct subgroups of Kreutz comets which reach peak brightness at slightly different heliocentric distances is reexamined and modeled. We compare the Kreutz comets with other comets observed by SOHO-LASCO (the sungrazing families: Meyer, Marsden, and Kracht, and other non-sungrazing comets) and with observations of prominent sungrazers seen from the ground (e.g. C/1965 S1 Ikeya-Seki) to estimate production rates at larger heliocentric distances. From these rates we improve the scaling relationship between size and apparent brightness and constrain the size distribution of the Kreutz family. Finally, we predict discovery rates of Kreutz comets by the upcoming STEREO mission and ground-based surveys such as Pan-STARRS.

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