INSERT YOUR ABSTRACT HERE ACCORDING
TO THE FOLLOWING INSTRUCTIONS

(Maximum length = 400 words)

Size Distribution, Structure and Density of Cometary Nuclei

Paul R. Weissman and Stephen C. Lowry (Jet Propulsion Laboratory)

The physical nature of cometary nuclei remains one of the most important unresolved mysteries in solar system science. We have compiled a catalog of CCD, IR, and spacecraft measurements of the dimensions of cometary nuclei. The catalog contains 97 measurements of 53 JF and 3 HT comets. The data have been normalized to an assumed albedo of 0.04 except in cases where the albedo was directly measured. We find that the cumulative number of Jupiter-family comets at or larger than a given radius can be described by a power law with a slope of -1.60 ± 0.03. This corresponds to a slope of -0.32 ± 0.01 for the cumulative luminosity function (CLF), identical to the value found by Lowry [1]. Both values are considerably less than the slope of -0.53 ± 0.05 found by Fernández et al. [2]. This inconsistency is likely attributable to the small number of comets actually fitted by the power law in their sample, only 9 comets, versus 39 in our sample. Typical values of the CLF slope for Kuiper belt objects (KBOs) are −0.64 to −0.69 [3,4]. The shallower slope of the JF comets, which are considerably smaller than the observed KBOs, may be due to intrinsic differences in the KBO size distribution at the different size ranges [5] or to the physical evolution of JF comets as they lose mass through sublimation and fragmentation. The best models for the physical structure of cometary nuclei are the "fluffy aggregate" of Donn and Hughes [6] and the "primordial rubble pile" of Weissman [7]. Densities of cometary nuclei are not well constrained as they have only been measured indirectly to date [8,9,10]; the best values are between 0.4 and 1.1 g cm^{-3}. This work was supported by the NASA Planetary Geology & Geophysics Program and the National Research Council.

[1] S. Lowry (2001) Ph.D. thesis, Queen's University, Belfast.
[2] J. Fernández et al. (1999) Astron. & Astrophys. 327.
[3] B. Gladman et al. (2001) Astron. J. 1051.
[4] C. Trujillo et al. (2001) Astron. J. 457.
[5] P. Weissman, H. Levison (1997) In *Pluto and Charon*, 559.
[6] B. Donn, D. Hughes (1986) In ESA SP-249, **3**, 523.
[7] P. Weissman (1986) Nature 242.
[8] R. Sagdeev et al. (1987) Nature 240.
[9] S. Peale (1989) Icarus 36.
[10] E. Asphaug, W. Benz (1994) Nature 120.