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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
RESEARCH AND TECHNOLOGY RESUME

TITLE

Asteroid and Comet Surfaces

PERFORMING ORGANIZATION

California Space Institute, University of California, San Diego

INVESTIGATOR'S NAME

Lucy-Ann McFadden

DESCRIPTION *(a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)*

A. Strategy: Photometric and spectrophotometric studies of asteroids and comets are in progress to address questions about the mineralogical relationship between asteroids near the 3:1 Kirkwood gap and ordinary chondrite meteorites and between cometary nuclei and the surface of asteroids.

B. Progress: i) The method to convert the measured excess UV flux in the spectrum of 2201 Oljato to column abundance of OH and CN was derived. ii.) Spectral reflectance measurements of large asteroids near the 3:1 Kirkwood gap, which is expected to be the source of ordinary chondrite meteorites, were briefly examined and show no spectral signatures that are characteristic of ordinary chondrite meteorite powders measured in the lab. iii.) A review paper on the physical properties of near-earth asteroids was written for the Asteroids II book. iv) A section in the chapter on the Relationships between comets and asteroids for the Asteroids II book was written. v.) A study of the bare nucleus of comet Neujmin 1 was completed in which its photometric and thermal properties were studied and related to asteroid types. This paper won an award for best physics paper by an employee of SAIC (Campins) in 1987.

C. Anticipated Accomplishments i.) Perform the calculations to quantify potential OH and CN emission in spectrum of 2201 Oljato. Complete the paper on this subject. ii) Perform final data reduction on near-IR reflectance spectra of asteroids near 3:1 Kirkwood gap. Write up the results. iii.) Observe asteroids in comet-like orbits to determine their relationship to comets and other asteroids with CCD spectrometers and Near-IR spectrometers.

D. summary bibliography

McFadden, L.A., Tholen, D.J., Veeder, G.J. "Physical Properties of Near-Earth Asteroids" to appear in Asteroids II. R. Binzel and T. Gehrels, eds. U. of Arizona Press, Tucson, 1989.

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McFadden, L.A., A'Hearn, M.F., Feldman, P.D., Roettger, E.E., Edsall, D.M., Butterworth, P., "Activity of Comet P/Halley 23-25 March, 1986: IUE Observations", *Astronomy & Astrophysics*, **187**, 333-338, 1987.

Campins, H., A'Hearn, M.F., and McFadden, L.A., "The Bare Nucleus of Comet Neujmin-1", Astrophys. J., **316**, 847-857, 1987. SAIC Award for Best Physics Paper 1987.

McFadden L.A. and Vilas, F., The 3:1 Kirkwood Gap as Sources of Ordinary Chondrites: Perspectives from Spectral Reflectance, Lunar and Planetary XVIII, 614-615, 1987.

McFadden, L.A., A'Hearn, M.F., and Feldman, P.D., Variable Activity at Comet Halley March 23-25, 1986: IUE Observations, Lunary and Planetary XVIII, 616-617, 1987.