N89-16665

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
RESEARCH AND TECHNOLOGY RESUME

TITLE

Infrared Observations of Solar System Objects

PERFORMING ORGANIZATION
University of Arizona
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INVESTIGATOR'S NAME

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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**: This program is a continuing effort to study the near infrared (reflected) to thermal infrared flux from asteroids and other airless bodies using groundbased telescopes. The goal of the observations is to investigate the mineralogy and thermophysical properties of these bodies and to support present and potential future missions such as Galileo, CRAF, IRAS and SIRTF.

b. **Accomplishments**: During the past year, we have continued our search for water of hydration on asteroids. 1) Our work has shown that water in the form of hydrated silicates does not exist on the surfaces of the outerbelt asteroids. This implies that the water we see on the c-class asteroids is most likely aqueous alternative products. That water in the ultraprimitive asteroids may be in the form of ice rather than water of hydration. 2) We are also continuing our work on the thermal properties of asteroids. We have found that the lightcurve of 532 Herculina is done primarily to shape rather than the proposed surface albedo variation. 3) In collaboration with other groups we have taken advantage of the mutual events between Pluto and its satellite Charon; we have discovered water ice on the surface of Charon and are studying the surface composition of Pluto.

c. **Anticipated Accomplishments**: During the next year, we will continue to study the distribution of volatiles on asteroids. We will be concentrating on the fainter outer belt asteroids for which we have little data. We will also be working on refining our groundbased and IRAS thermal models with emphasis on improved thermophysical models and investigation of the discrepancies between groundbased and IRAS results. Finally, we will be continuing our studies of the spectral emission of Mercury for the determination of surface composition.

d. PUBLICATIONS

Buie, M. W., Cruikshank, D. P., Lebofsky, L. A., and Tedesco, E. F., Water frost on Charon, Nature 329, 522-523, 1987.

Hubbard, W. B., Rieke, G. H., Rieke, M. J., Lebofsky, L. A., and Marcialis, R. L., A grazing occultation by Neptune on 4 May 1986, Icarus (in press), 1988.

Lebofsky, L. A., Greenberg, R., Tedesco, E. F., and Veeder, G. J., Infrared lightcurves of asteroids 532 Herculina and 45 Eugenia: Proof of the absence of significant albedo markings, Icarus (in press), 1988.

Lebofsky, L. A., Jones, T. D., and Herbert, F., Asteroid volatile inventories, Atmospheres (in press), 1988.

Lebofsky, L. A., and Spencer, J. R., Radiometry and thermal modeling of asteroids, (R. Binzel, Ed.), University of Arizona Press, Tucson, AZ (submitted), 1988.

Sykes, M. V., Cutri, R. M., Lebofsky, L. A., and Binzel, R. P., IRAS serendipitous survey observations of Pluto and Charon, Science 237, 1336-1340, 1987.

Tyler, A. L., Kozlowski, R. W. H., and Lebofsky, L. A., Determination of rock type on Mercury and the Moon through remote sensing in the thermal infrared, (submitted to Geophys. Res. Lett.), 1988.