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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
RESEARCH AND TECHNOLOGY RESUME

TITLE

Radar Studies in the Solar System

PERFORMING ORGANIZATION

Smithsonian Astrophysical Observatory
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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. Our research is twofold: we (i) develop the ephemerides needed to acquire radar data at Arecibo from observations of various solar-system objects, and (ii) analyze the resultant data to (A) test fundamental laws of gravitation; (B) determine the size, shape, topography, and spin vectors of the targets; and (C) study the surface properties of these objects through their radar scattering and polarization characteristics.

b) Accomplishments. We continued the ongoing program of radar observations in collaboration with our colleagues S.J. Ostro and M.A. Slade (JPL) and D.B. Campbell (Arecibo and Cornell). Ephemerides were prepared, and observations were carried out at Arecibo, for the numbered asteroids 4, 20, 105, 654, 1566, 1981, 2212, 3554, and 3757. All of these were successfully detected except Icarus (1566), from which we had hoped to improve our determination of the Sun's quadrupole moment and a model parameter for testing general relativity. The observing program also included Arecibo observations of Mercury, Venus, and the Galilean satellites of Jupiter. The Mercury observations at Arecibo were all within a week of the epoch of a closure point (same surface position as a previous observation), and one was matched by a near-simultaneous observation at Goldstone.

c) Plans. We will continue our participation in the planetary radar program at Arecibo, which includes plans for more Mercury closure points and near-simultaneous Goldstone-Arecibo observations for inter-system calibration. In the fall of 1988, there will be opportunities to observe not only asteroids and the Galilean satellites, but also Phobos and Deimos, the satellites of Mars. We plan to make a comprehensive determination of Venus' spin vector from two decades of data, including the results from the current apparition.

d) Publications. None

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OF POOR QUALITY