15 December 1967, Volume 158, Number 3807

SCIENCE

Are We to Abandon the Planets To the Soviet Union?

During the past 5 years the United States has undertaken five interplanetary-planetary missions to Venus and Mars. Three of these—Mariners II, IV, and V—have been notably successful, both technically and scientifically. The observations have yielded marked advances in knowledge and understanding of the atmospheres, the ionospheres, and the thermal and magnetic properties of Venus and Mars. Not the least of the consequences of these new findings has been a deeper insight into the nature of the earth as an astronomical and physical object of great complexity and wonderment. Portions of the Martian surface have been studied by television photography with a resolution of a few kilometers, such resolution being quite unattainable by any terrestrial technique. During the journeys to the planets important contributions to our knowledge of the physical characteristics of the interplanetary medium and the propagation of energetic particles therein have been made, the impulsive emission of energetic electrons by the sun has been discovered, and the soft x-ray emission of the sun has been monitored continuously for extended periods.

The technical requirements of such missions have motivated many advances in telecommunications, in the science of navigation in the solar system, and in the development of long-lived electronic and mechanical systems. Intelligible telemetry signals from Mariner IV have been received from ranges as great as 320 million kilometers, and the spacecraft continues to operate properly after 36 months of interplanetary flight. The entire Mariner V mission, which culminated in a close flyby of Venus on 19 October 1967, was conducted with such precision and competence as to draw cheers from even the most hardened professionals.

All of this has been accomplished at a cost of less than 2 percent of the budget of the National Aeronautics and Space Administration.

Yet, current congressional action provides for no preparatory work during fiscal year 1968 for any specific planetary mission beyond the presently approved pair of Martian flyby missions in 1969. Even more devastating is the reluctance of NASA to forcefully request adequate funding for such work during fiscal year 1969, despite the existence of well-conceived programs of great scientific potential which are being urged by its several advisory bodies. Specific targets of high interest are Mars, Venus, Mercury, and Jupiter. The basic technology is available, and a rich diversity of feasible experiments has been proposed by university groups and government laboratories.

Although I am not privy to the plans of the Soviet Union for further planetary exploration, its past history [*Science* **151**, 945 (1966)] and its recent, successful dropping of a scientific capsule through the Venusian atmosphere suggest that such plans are both ambitious and increasingly competent. Despite such evidence, the United States is now allowing its own high competence in planetary exploration to decay and is thus abandoning *in situ* study of the planets to the Soviet Union. Surely this trend must be reversed if we are to regard intellectual leadership as one of the most central of our national objectives.

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