

LUNAR MISSIONS

Study objectives

The lunar mission studies of the past year have concentrated on two objectives. One was to finalize the definition of Apollo Applications system elements in preparation for their development. The second was to establish a realistic basis for the objectives, requirements and systems for lunar exploration beyond that anticipated to be accomplished within the scope of the Apollo Applications program.

Continued support of the scientific community in the establishment of overall objectives has helped in providing focus to the program with respect to both scope and sequence. Engineering studies of potential systems have sharpened our understanding of the capabilities and costs of the follow-on program options which are being considered. The accomplishments of the Surveyor and Orbiter programs, however, have emphasized the need to develop plans which will assure the opportunity to incorporate incremental learning in our downstream program elements.

Support for scientific goals

As we progress beyond Apollo, the lunar exploration program is increasingly influenced by the nature of the scientific program which it supports. Although the scientific accomplishments of the Apollo program will have a significant influence on our understanding of the moon, the system elements of the program have been predominantly influenced by operational rather than scientific requirements. Logical program evolution beyond Apollo, on the other hand, is directly related to the objectives and requirements of scientific goals.

As we have analyzed the implications of these goals, it has become apparent that the early findings of the program may have a profound influence on the requirements to be imposed on later program systems. For this reason, it is not appropriate at this time to finalize the duration of the lunar portions of the Apollo Applications program, the specific sites which shall be explored during the program or the detailed experimental composition of latter missions. It is, however, appropriate and timely to examine the most effective methods of accomplishing projected goals so that, as we are able to establish specific goals, we can proceed with system development and mission operations without undue delay.

Evolution of lunar exploration program

In following this logic, and in anticipation of the results of the Apollo and Apollo Applications lunar landing missions, a candidate lunar exploration program has been laid out. The program follows the step-by-step concept discussed earlier and is shown in this chart (fig. 120, MC66-10,245). This concept presumes a motivation and resource capability to carry out a reasonably comprehensive lunar exploration.

The program is phased to permit the results of early missions to have maximum impact upon later system developments and missions. It delays the requirement for major new developments until after initial Apollo landings and projects the introduction of new system capability which can efficiently support missions over a wide range of expanding or diminishing program commitment. Both our broad and detailed program and system analysis is being performed against such a candidate program structure.

Three major scientific goals have been set for lunar exploration. The first is to develop, through scientific investigations, a comprehensive understanding of the lunar surface and interior. The second is to develop perspective in understanding our own planet and the solar system in which it resides. The third is to establish the role of the moon in future astronomical and space investigations of the solar system.

Apollo Applications missions

Since less than 1 percent of the moon will be studied during proposed surface missions, our broad understanding of the moon will come from information gathered by remote sensors flown in lunar orbit. The types of information which these sensors are best designed to obtain are topographic, geologic, magnetic, radiation temperature, gravity, and radiation and micrometeorite fluxes.

In addition to, and possibly simultaneously with the orbital missions, it would be necessary to conduct surface missions in order to make direct observations and