

Experiments in the Apollo Applications flights could lead to manned or automated earth orbiting navigation and traffic control systems which could provide many benefits. Improved position fixing may reasonably be expected to increase efficiency of operation of all types of ships and aircraft by saving transit time and allowing greater margins of safety in passing obstructions.

In addition to the savings afforded by faster passages, merchant ship operations would benefit from better maintenance of schedules and avoidance of overtime and idle paid time of stevedores. Better position information is particularly needed when a vessel approaches landfall after several days at sea. Commercial fishing vessels can improve their economic situation if they can return expeditiously and accurately to favorable fishing areas.

Astronomy and space physics observations

Apollo Applications follow-on missions operations will provide opportunities for experimenters in the fields of Astronomy and Space Physics. Apollo Applications experiments will permit important and unique observations of the sun starting in 1969. At the same time, they will provide experience that is essential for the design and operation of future large telescopes in space, whether they be manned or unmanned, opening up a whole new chapter in the exploration and understanding of the universe.

Ultimately, the knowledge to be gained from a manned orbiting observatory in space may result in earthly benefits—benefits to each and every citizen of the world which far exceed that of any other application of the space program. This understanding could lead to the development of new sources of energy; to the acquisition of new and presently unknown materials; eventually to the contact of our culture with other cultures in other solar systems in the universe with results which are beyond our ability to predict or to comprehend.

Orbiting optical telescope

A typical orbital operational area concerns manned orbital astronomical observations using optical telescopes. Astronomical observations may be made on all stellar objects and the sun. Particularly, solar astronomy will be concentrated in the 1969-1971 period of peak solar activity which will not recur for 11 years. The orbital vantage point would allow optical astronomy free of atmospheric distortion and filtering.

Once a telescope is mounted on the Apollo spacecraft and placed in orbit, the astronauts would adjust and operate it. The film and plates would be returned by the astronaut at the end of the first mission, and it may be feasible for the telescope to be left in orbit to be reactivated when the astronaut returns on subsequent missions.

It is estimated that both the quality and quantity of the data from these experiments would be greater than what has been obtained previously. Man's ability to operate and maintain orbital telescopes would be tested, as well as systems and subsystems for future manned and unmanned astronomical missions.

Space Physics experiments

Space Physics experiments are also planned for astronomy missions. X-ray astronomy, ultra-violet spectroscopy, ion wake physics, and investigations of particles and fields are in this category.

Technology experiments

Technology experiments planned for follow-on Apollo Applications missions are focused upon the procurement of data in a space environment as needed for development of advanced systems for future missions. Initially, the required work space in orbit will be provided by a spent uprated Saturn I 2nd stage used as an orbital laboratory or workshop. Extravehicular activity experiments may involve the manned assembly and test of large structures such as radio and optical antennas; and the development of procedures for transfer, launch and recovery in space. Examples of the development of manipulative capability experiments include optical technology, manned locomotion and maneuvering (fig. 88, ML67-5534), maintenance and repair techniques, and the launch of unmanned satellites after they have been calibrated and checked out in orbit. Such launches may provide for a higher probability of successful operation and more accurate insertion into orbit.