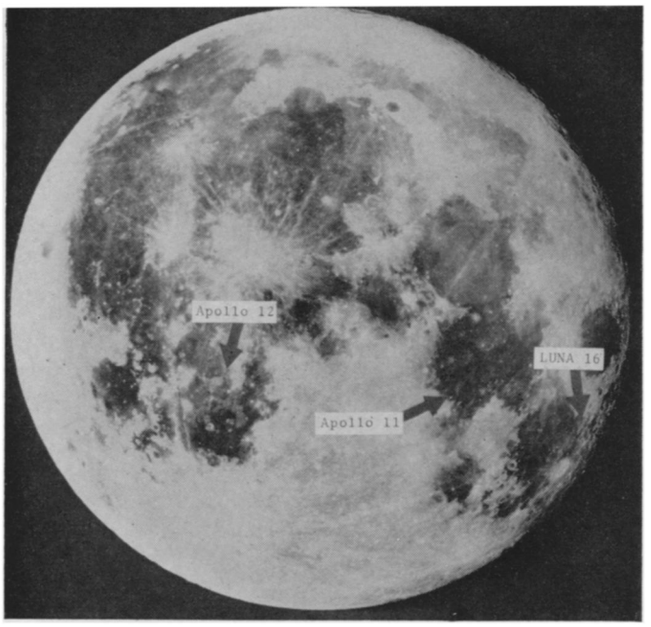
Unmanned to the moon and back

Russia's Luna 16 is returning rocks from what may be one of the moon's older seas



"The automatic delivery of lunar ground to the earth," as the Soviet Union described the feat of the landing and lift-off of its unmanned Luna 16 station from the moon's Sea of Fertility (Mare Fecunditatis) this week, scored for the Russians another first in space technology. Dr. George Low, Acting Administrator of the National Aeronautics and Space Administration, described the mission as a major engineering and scientific achievement.

Luna 16 landed automatically on the moon Sept. 20, four days after launch. According to the Soviet news agency, Tass, after landing the station took measurements of its position relative to the moon and made a checkout of its onboard systems. Then a command was given to begin the operation of the rock-taking mechanism—an electrical drill, controlled from the earth. The apparatus took samples of rock and lunar soil to a depth of about 14 inches and transferred the material to a container in the spacecraft, where the samples were hermetically sealed. After about one day's experimentation, the spacecraft, using the landing stage as a launch pad, blasted off from the moon in a ballistic trajectory for its journey back to earth.

The landing stage of the station, called Cosmodrome, continued to send back to earth temperature and radiation measurements. No mention was made of other lunar experiments that could be housed in the station, such as a seismometer to measure lunar quakes, or instruments to monitor particles and fields.

The Russians did report there were clouds of dust when the spacecraft landed and took off. Reports from the West German space observatory at Bockhum said the craft transmitted what it termed excellent test pictures upon landing.

The Sea of Fertility has not been explored by any American spacecraft nor has it even been considered a candidate landing site. (The closest American landing was that of Surveyor 5, some 600 miles to the west.) Based on the number of craters in the sea, some scientists believe that it is one of the older of the moon's maria. If so, Soviet analyses of the ages of the rocks and soil could be important in the scientific search to unravel the moon's history. The oldest Apollo rock retrieved was from the Ocean of Storms returned by Apollo 12. Its age was estimated at 4.6 billion years (SN: 5/30, p. 528).

Luna 16 is the first spacecraft to land on another body in the solar system and return to earth automatically. Although the two American manned Apollo landings have now overshadowed the Soviet unmanned lunar flights, the Russians' Luna series has contributed significantly to the history of lunar exploration. Luna 2 was the first craft to hit the moon in September of 1959. Luna 9 was the first to make a soft landing on the moon in February 1966, preceding the first American Surveyor soft landing in June. Luna 10 was the first craft to orbit the moon in March 1966, preceding the first American Lunar Orbiter in August of the same year.

There is little doubt that Luna 15, launched July 13, 1969, only three days before the launch of the Apollo 11 craft that carried the first men to a lunar landing was supposed to do what Luna 16 did: land on the moon, scoop up lunar rocks, and return them to earth—in Luna 15's case, conveniently returning ahead of the Apollo 11 rock samples. Most space officials believe that Luna 15 crashed, instead of soft landing on the moon.

If the lunar cache is recovered successfully, a complex task in itself, NASA officials believe that round trips to Mars and Venus by automated robot-type spacecraft will soon be on the Soviet space agenda.

At one time, the United States' space agency considered a similar type of lunar round trip flight to follow the last Surveyor spacecraft, number 7. These unmanned spacecraft would have been called something like Super Surveyors. But the Apollo program was by then in full swing, and the automated idea was abandoned.

In recent months, however, the study of automated systems, teleoperators or robot systems has been revived within NASA (SN: 7/25, p. 64). These would supplement man's activities in space, for use in extravehicular activities or as additional hands on the lunar surface. And they could be used in unmanned explorations of the planets.

In addition, lunar scientists, even before the cut of two more Apollo landings on the moon, had recommended that the Apollo series be followed by continued exploration of the moon with unmanned landers and orbiters.

"But the manned landings (not to diminish the technological acomplishment of Luna 16)," says one NASA scientist, "have unlimited value over the unmanned, in that the rocks and samples can be documented by man, and man's geological observations of the landing site correlated with the returned samples." Automated systems may sample only one spot. Astronauts can retrieve rocks from a variety of geological formations at one site that may differ in age by millions of years.

Although publicly available results of the automated Russian flight may be as scanty as details of the flight itself have been, NASA officials are hopeful that the success of Luna 16 and the Fertility rocks might open the door for further cooperation with the Russians in the exploration of the solar system.

At least, Dr. Low is hopeful. "We look forward," he says, "to sharing in the information which will be developed by an analysis of the samples." □

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