The last Apollo landing: A mountain valley

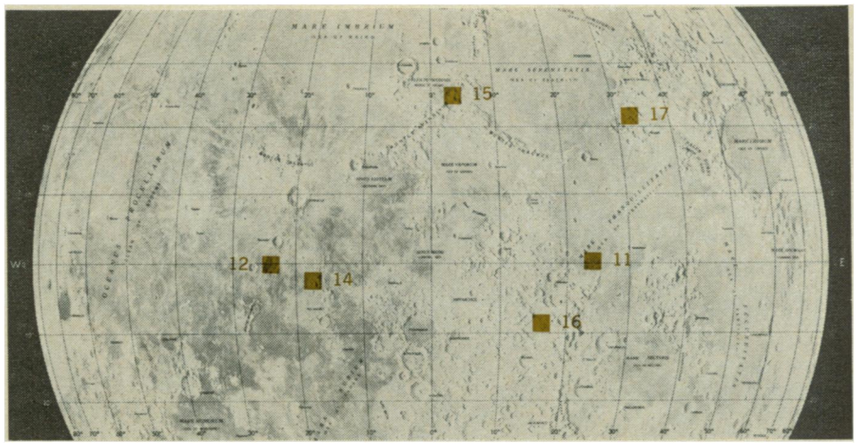
With the launch of Apollo 17 in December, Project Apollo will come to an end, and with it will end a period that one day may be called the golden age of lunar exploration. If all goes well, man will have explored six different regions of the moon. With this sampling, scientists will then have to piece together a "whole moon" story. The finality of it all added an extra dramatic ingredient to the scientific debate about where Apollo 17 should land. The choice—Taurus Littrow—was announced this week by NASA.

No one site on the moon could satisfy all of the requirements of the diverse group of scientists—geochemists, geologists, geophysicists—studying the moon. But Taurus Littrow comes close. The scientists have talked in the past about landing at Tycho in the Southern Highlands (SN: 9/19/70, p. 247), and Tsiolkovsky on the far side (SN: 9/18/71, p. 194). But where the astronauts land is constrained by the launch dates and the operational capabilities of the Apollo hardware. It is possible—with a little encouragement—to stretch the system and do some difficult things. But the system can only be stretched so far.

The choice for Taurus Littrow was an example of NASA's stretching the capability for science—but not too far.

There were three strong sites considered for Apollo 17—which will be the only mission to carry a geologist to the moon (SN: 9/4/71, p. 137). They wer the craters Alphonsus and Gassendi and Taurus Littrow. The story goes that engineers at the Manned Spacecraft Center concerned with spacecraft tracking, flight trajectories and landing problems had settled on Alphonsus. It was the easiest to get to. Littrow and Gassendi were inaccessible. Since Alphonsus had been recommended for Apollo 16 and lost to Descartes (SN: 6/12/71, p. 397), why not go to Alphonsus? The landing site science committee, however, had recommended in January either Littrow or Gassendi. So Apollo program directors at NASA headquarters commissioned the "landing people" at MSC to do some more homework—and sure enough, astronauts could land at Littrow. But Gassendi was still too difficult. So Taurus Littrow won out.

Taurus Littrow will have a little for everyone. It will be a dramatic landing between two mountains that are two kilometers high. The site is southwest of the crater Littrow. The mountains—part of the Taurus range—are part of what is left of the original surface material (called terrae) located above Mare Tranquillitatis on the northeastern limb of the moon. They are similar in appearance to the Central and Southern Highlands, and are bait for those wanting old rocks (particularly the geochemists).



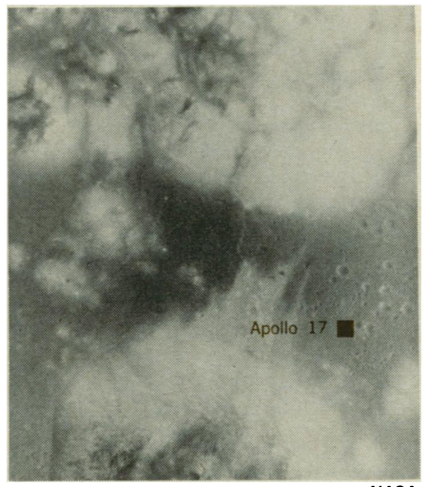
The six Apollo lunar landing missions will have sampled a variety of features.

A landslide has occurred on one of the mountains, and rocks from various layers of the mountain are laying down in the valley where the astronauts will land. Scientists hope rocks that date the event that formed the Serenitatis Basin (to the east of the site) can also be found. Serenitatis is considered one of the oldest circular basins.

But what really intrigued some scientists (mainly geologists who want to look at lunar processes) was the confirmation from Apollo 15 observations that the mare material at the site appeared very young—perhaps younger than 3.3 billion years. It is darker than the material that fills the Serenitatis Basin. And nestled right there in the landslide debris is what looks like a volcanic dome—a crater surrounded by dark material. And to satisfy the geophysicists who need rather simple areas well spread out for their measurements, the site affords a smooth area in between the mountains.

What could be better for the last Apollo site than one that pleased (reasonably speaking) the geologists who want to look at volcanic processes, the geochemists who want old rocks, and the geophysicists who want measurements spread out over the moon? This cinched the site for Apollo 17.

Furthermore, obtaining rocks that could be younger than 3.3 billion years and older than 4.2 billion years could fill in the gaps in the lunar timetable. So far, astronauts have returned samples from two maria (Apollo 11 and 12) and two Imbrium event sites (Apollo 14 and 15). Apollo 12 samples dated 3.3 billion years as did the Mare Putredinis at the Hadley/Apennine site. Apollo 11 samples dated 3.6 billion years. Apollo 14's Fra Mauro site composed of ejected material from the Imbrium event dated 3.9 billion years. And one rock—the "Genesis Rock" found at the Apennine front dated 4.2 billion years. Did all action on the moon happen between 3.3 billion and 4.2 billion years ago? Scientists don't think so. With Descartes and Taurus Littrow they hope to get younger and older material.



NASA

Taurus Littrow: Site for Apollo 17.

All three sites under consideration for Apollo 17 had something to offer. Gassendi crater—the favorite of some geologists—is located at about 18 degrees south latitude and would have been the closest site to the old Southern Highlands, which also has material of the original surface.

Alphonsus crater in the Central Highlands (west of Descartes) could have yielded material representative of the moon's original terrae. But this region is also filled with material from an event (possibly vulcanism) that occurred after the highlands were formed but before the maria were flooded. This material, called Cayley, will be sampled at Apollo 16's Descartes. And since the old material at Alphonsus might have been covered up anyway by the younger material, the choice tilted toward Taurus Littrow. □